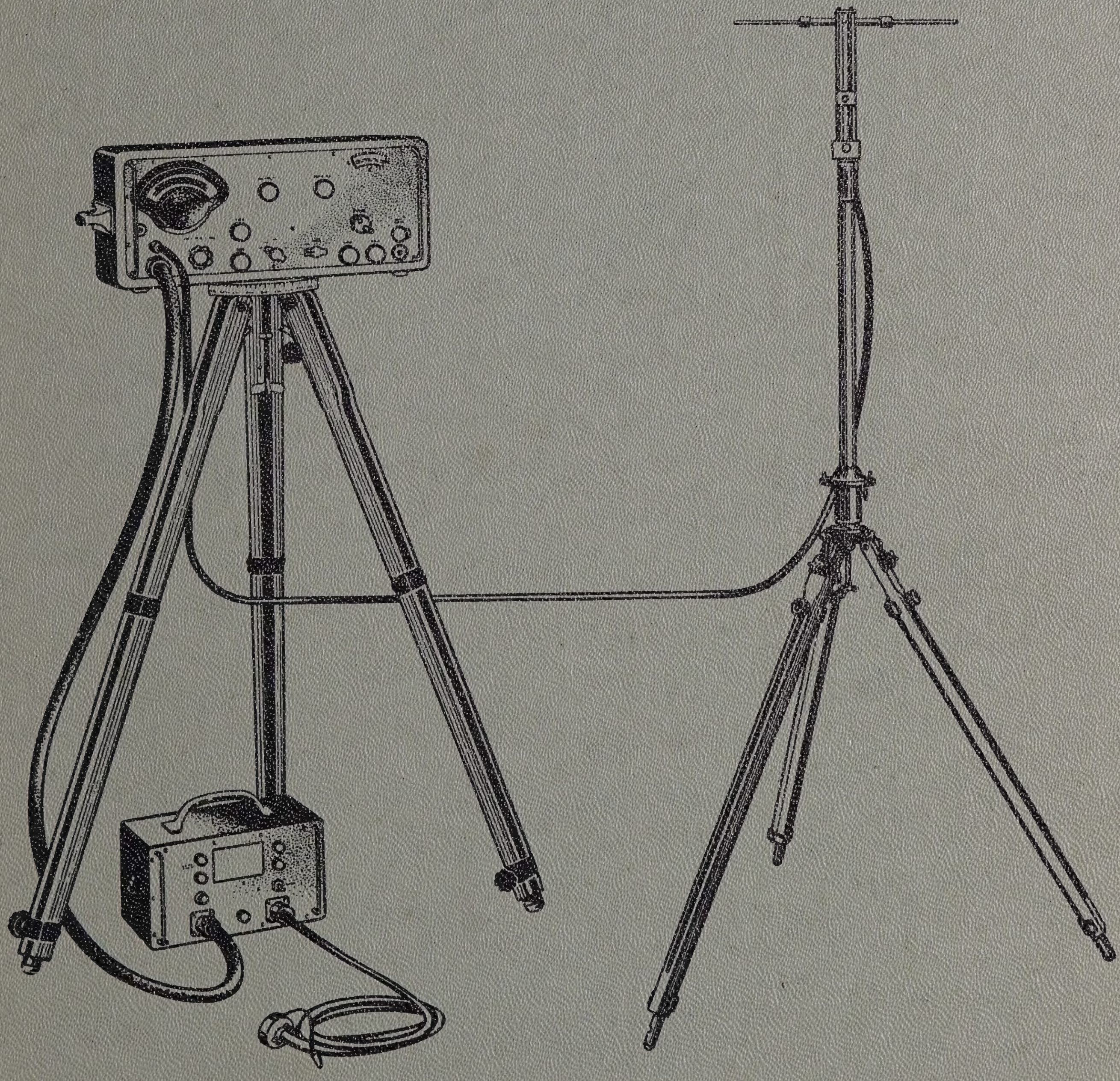
INSTRUCTION BOOK

FOR

# MODEL NM-50A
## RADIO INTERFERENCE AND FIELD INTENSITY METER

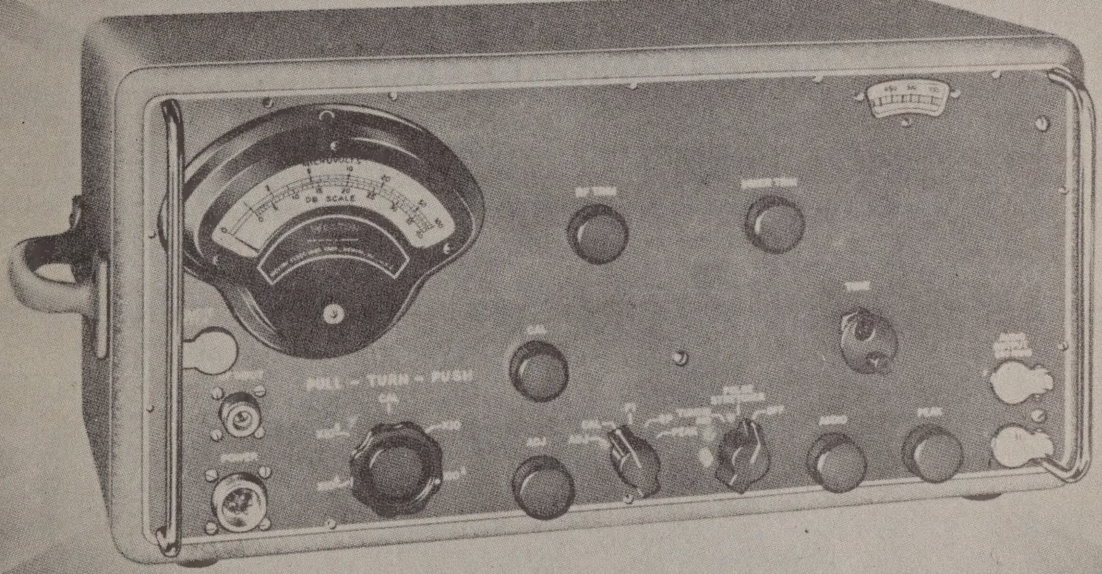


**STODDART AIRCRAFT RADIO CO.**

6644 SANTA MONICA BOULEVARD

HOLLYWOOD 38, CALIFORNIA

# INSTRUCTION BOOK
FOR
# RADIO INTERFERENCE-FIELD INTENSITY METER
## NM-50A



**STODDART AIRCRAFT RADIO COMPANY**
6644 SANTA MONICA BOULEVARD
HOLLYWOOD 38, CALIFORNIA

Compiled August 3, 1951

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The NM-50A and its military counterpart the AN/URM-17A are electrically identical. Differences occur only in the finishes and accessories supplied. Use the CADV number when ordering from the parts list, Section 8.

EQUIPMENT CROSS REFERENCE LIST*

| MILITARY | | COMMERCIAL | |
|---|---|---|---|
| NAME OF UNIT | AN DESIGNATION | DESCRIPTION | PART NO. |
| CASE (TRANSIT) CONTAINING: | CY-866/URM-17 | TRANSIT CASE | 90351-2 |
| RADIO INTERFERENCE FIELD INTENSITY METER | IM-52A/URM-17 | NM-50A RI-FI METER | |
| HEADPHONE | H-132/U | HEADPHONES, 300-700 CPS ''HI-FI'' RESPONSE | 10796 |
| CHART SET | PT-430/URM-17A | CALIBRATION CHARTS | |
| INSTRUCTION BOOK | NAVSHIPS 93083A | INSTRUCTION BOOK | NM-50A |
| CASE (ACCESSORY) CONTAINING: | CY-2266/URM-17A | ACCESSORY CASE | 91476-2 |
| POWER SUPPLY | PP-530/URM-17 | POWER SUPPLY | 90329-4 |
| ANTENNA | AT-791/URM-17A | DIPOLE ANTENNA | 90330-3 |
| R.F. PROBE | DT-194/URM-17A | LINE PROBE | 91477-2 |
| POWER CABLE ASSEMBLY | CX3810/U (6'6'') | A.C. POWER CABLE, 6'6'' | 91258-1 |
| SPECIAL PURPOSE CABLE ASSEMBLY | CADV-91847(10'0'') | POWER SUPPLY CABLE, 10' | 91847-1 |
| R.F. CABLE ASSEMBLY | CG-92D/U(20'0'') | R.F. TRANSMISSION LINE, 20' | 90933-8 |
| AMMETER | ME-131/U | REMOTE METER | 90078-6 |
| CABLE ASSEMBLY (REMOTE METER) | CG-571/U20'0'' | REMOTE METER CABLE, 20' | 90075-2 |
| CABLE ASSEMBLY (HEADPHONE EXTENSION) | CG-572/U(20'0'') | HEADPHONE EXTENSION CABLE, 20' | 90074-1 |
| BAG (TRIPOD) CONTAINING: | CW-218/URM-17 | TRIPOD BAG FOR PART #90310-2 | 90407-2 |
| TRIPOD | CADV-10545 | COLLAPSIBLE TRIPOD FOR PART #90330-3 | 90310-2 |
| ANTENNA MAST SECTION | AB-363/U | ANTENNA MAST ASSEMBLY | 90920-2 |
| AZIMUTH DIAL ASSEMBLY | CADV-90044-1 | AZIMUTH DIAL ASSEMBLY | 90044-1 |
| AZIMUTH DIAL POINTER | CADV-90045-1 | AZIMUTH POINTER ASSEMBLY | 90045-1 |
| | | COLLAPSIBLE TRIPOD FOR NM-50A | 90095-2 |
| | | TRIPOD BAG FOR PART #90095-2 | 90186-2 |
| | | GRAPHIC MILLIAMMETER RECORDER | 90097-2 |
| | | RECORDER CASE | 90101-2 |
| | | RECORDER CABLE, 6' | 90075-1 |

* USE THE STODDART COMMERCIAL PART NUMBER WHEN ORDERING FROM THIS LIST.

# RECORD OF CORRECTIONS MADE

| CHANGE NO. | DATE | SIGNATURE OF OFFICER MAKING CORRECTION |
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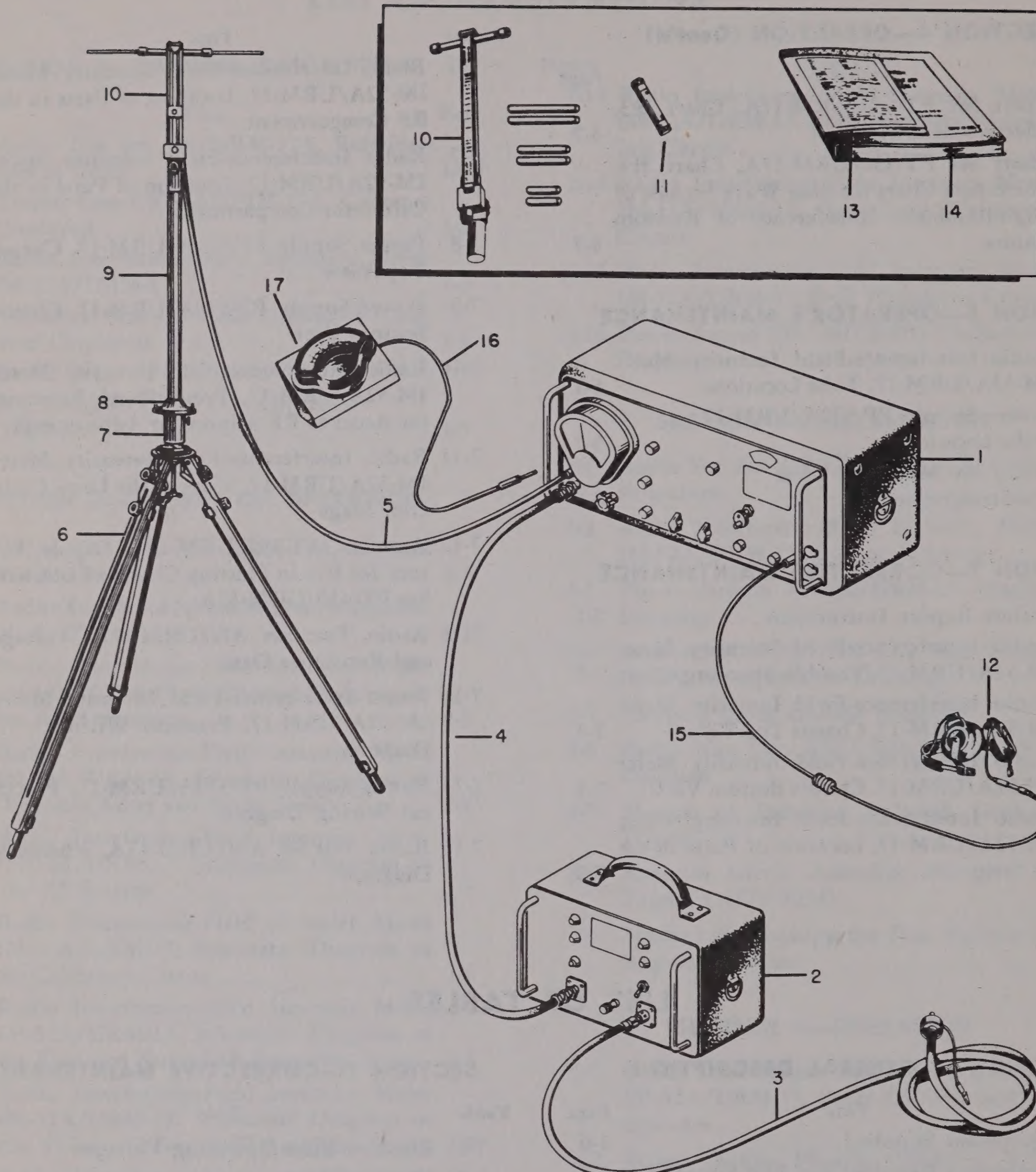


1. Radio Interference-Field Intensity Meter IM-52A/URM-17
2. Power Supply PP-530A/URM-17
3. Power Cable Assembly CX-3810/U (6'6")
4. Special Purpose Cable Assembly 91487-1 (10'0")
5. R.F. Cable Assembly CG-92D/U (20'0")
6. Tripod CADV-10545
7. Azimuth Dial Assembly CADV-90044-1
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10. Antenna AT-792/URM-17A
11. R.F. Probe DT-194/URM-17A
12. Headphone H-132/U
13. Chart Set PT-430/URM-17A
14. Instruction Book
15. Cable Assembly CG-572/U
16. Cable Assembly Special Purpose CG-571/U
17. Remote Meter ME-131/U

***Figure 1-1. Radio Test Set AN/URM-17A, Relationship of Units***

# SECTION 1

# GENERAL DESCRIPTION

## 1. SCOPE OF INSTRUCTION BOOK.

This instruction book contains descriptive material, theory of operation and instructions for installation, operation, and maintenance of Radio Test Set AN/URM-17A, Radio Interference and Field Intensity measuring equipment.

## 2. PURPOSE AND BASIC PRINCIPLES.

*(See figure 1-1.)*

*a.* Radio Test Set AN/URM-17A can be used for radio interference surveys to determine the source and magnitude of radiated or conducted interference from any source within its frequency range. Such interference may be generated by gasoline engines, generators, motors or electronic equipment. Field intensity measurement surveys may be made with Radio Test Set AN/URM-17A for adjusting directive antennas or for exploring radiation patterns, where the field intensity may vary over a wide range of values. The equipment may also be used as a sensitive radio frequency microvoltmeter. The equipment is suitable for operation aboard naval vessels, at shore stations, in the field, in aircraft, and in military vehicles.

**Note**

The Radio Interference-Field Intensity Meter IM-52A/URM-17 is the control and metering unit of Radio Test Set AN/URM-17A. For conciseness, it will be referred to herein as the "RI-FI" Meter.

*b.* Radio Test Set AN/URM-17A comprises the RI-FI Meter and its accessories which include a tripod, dipole antenna, line probe, separate power supply, and the necessary cables for connecting the accessories to the RI-FI Meter.

The RI-FI Meter is a sensitive radio receiver operating as a selective radio frequency voltmeter over the 375 to 1000 megacycle portion of the radio spectrum. It is capable of measuring voltages from 10 microvolts to 10 volts. As a field intensity measuring equipment, it is capable of measuring field intensities from 100 microvolts per meter to 100 volts per meter, depending on the frequency.

Operation of the equipment is flexible due to the nature of the accessories supplied. Power supply requirements are a source of 105 to 125 or 210 to 250 volts single phase, 50 to 1600 cycles per second, A.C. when the separate power supply is used, or a suitable battery pack used in place of the separate power supply. The equipment can be operated on a bench or table, or simply placed on the ground. The RI-FI Meter can be mounted on a tripod similar to Tripod MT-674/U (not furnished as part of Radio Test Set AN/URM-17A but is a part of Radio Test Set AN/URM-6). The dipole antenna is mounted on a tripod and is connected to the RI-FI Meter by means of a 20-foot length of 50-ohm coaxial cable. Signal monitoring provisions are available from panel-mounted headphone and remote meter receptacles. Measurements are made using the panel-mounted meter. Measurements can also be made using a remote meter or graphic recordings made by connecting a graphic meter RG-59/U or equivalent to the remote meter receptacle.

## 3. DESCRIPTION OF MAJOR UNITS.

*a.* CARRYING CASES.—Radio Test Set AN/URM-17A is contained in three carrying cases for convenience in transporting the equipment. Two cases—CY-2266/URM-17A and CY-866/URM-17 have similar construction. The cases are made of plywood with a black fibre covering inside and outside. They have metal corner guards to reduce wear. Each case has a folding grip handle. Draw bolts are used to securely close and lock the cases. Compartments in the cases are fitted with hooks, racks, blocks, straps, or pads to hold the various units in place. The cases are lined with felt to protect the equipment.

Bag CW-218/URM-17 is a canvas bag similar to a golf bag, in which the Tripod CADV-10545 and Antenna Mast Section AB-363/U are nested.

The succeeding subparagraphs describe the contents of the individual carrying cases and indicate the individual features of each case.

*b.* CASE CY-866/URM-17. *(See figure 1-2.)*—Case CY-866/URM-17, which will be called the "Transit Case," contains the RI-FI Meter, instruction book, and operating charts. Space in the cover is provided for headphones. Headphones H-132/U are provided under Contract NOBsr 71806.

(1) Radio Interference-Field Intensity Meter IM-52A/URM-17 is the control and metering unit of Radio Test Set AN/URM-17A. The gray wrinkle-finish case is equipped with a carrying handle on one end and a panel-cover held in place by spring clips. An elastic band in the panel-protective cover holds Chart PT-430/URM-17A in place. Tripod-mounting of the RI-FI Meter unit can be effected by means of a plate on the bottom of the case. Water seals under the front panel and at panel openings make the case substantially drip-proof. See figure 1-3 for general view of the RI-FI Meter with protective cover removed.

*c.* CASE CY-2266/URM-17A. *(See figure 1-4.)*—This case which will be called the "Accessory Case" contains the cables and accessory units furnished with Radio Test Set AN/URM-17A. To facilitate removing and replacing the cables, this case is not hinged. The top and bottom of the case are fastened by four draw bolts. The following are included within the case:

(1) Power Supply PP-530A/URM-17 supplies operating voltages required for the RI-FI Meter. The unit is similar in construction to the RI-FI Meter. Water seals under the front panel and at all panel openings

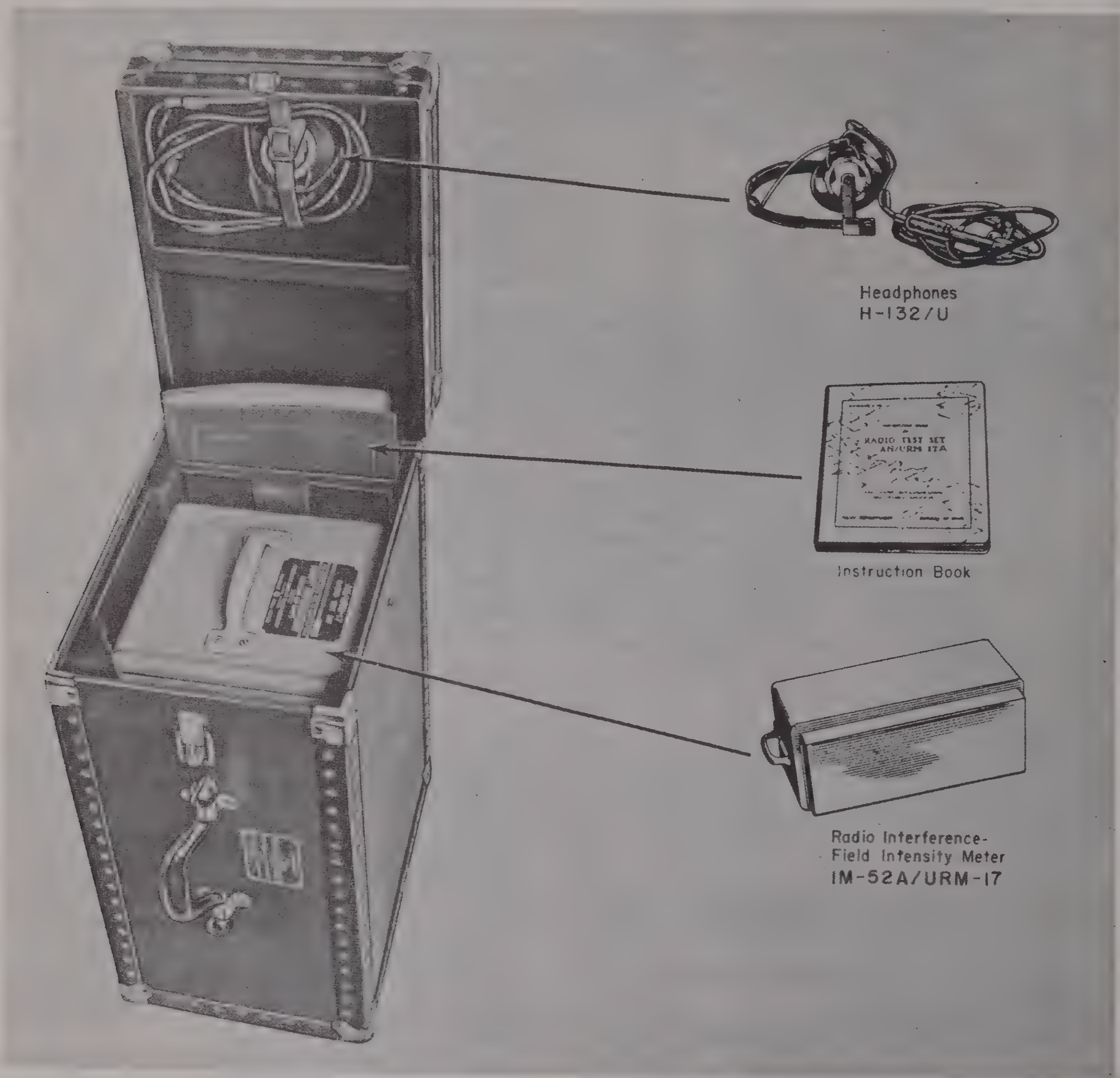



**Figure 1-2. Transit Case CY-866/URM-17, Contents Displayed**

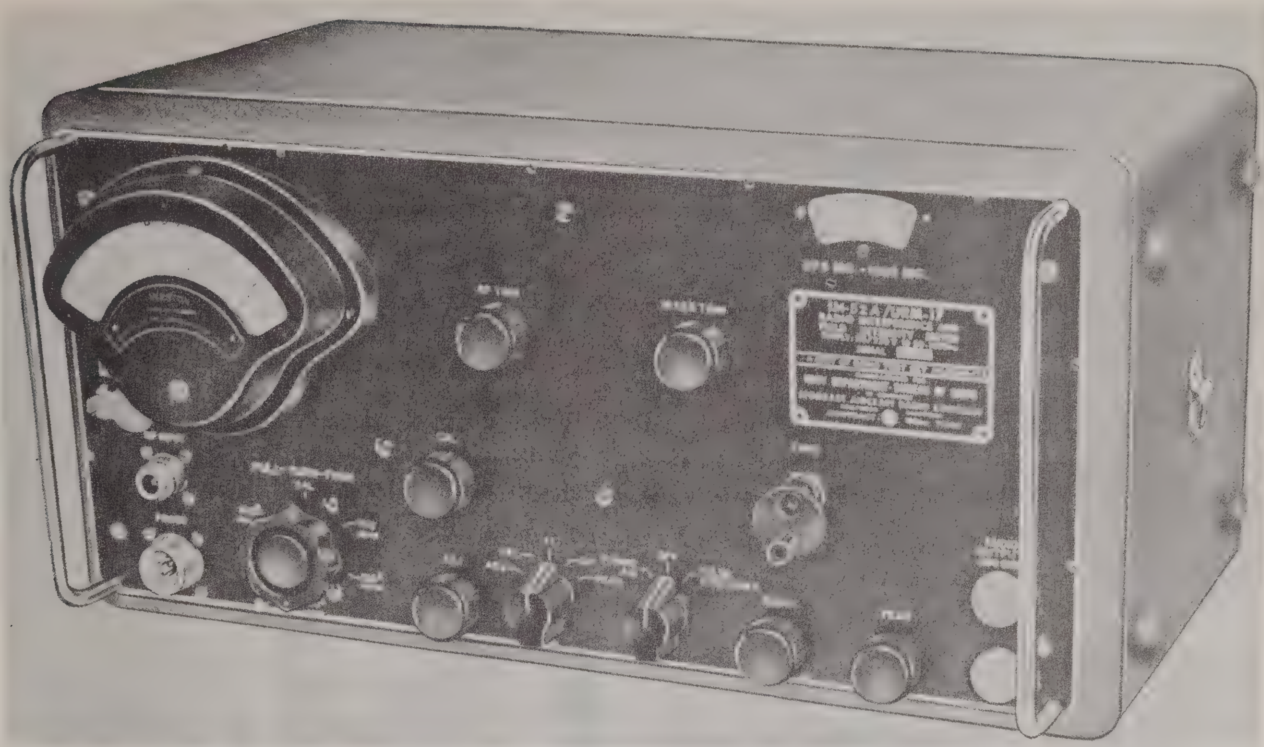


*Figure 1-3. Radio Interference-Field Intensity Meter IM-52A/URM-17*

make the case drip-proof. See figure 1-5 for general view with protective cover removed.

(2) Antenna AT-792/URM-17A is a dipole antenna that is tunable from 370 to 1000 megacycles and can receive radio waves of horizontal, vertical, or mixed polarization. The antenna consists of the antenna base, a matching transformer section, and a dipole section. Three sets of dipole elements are supplied to cover the tuning range, the elements of a given set mounting in a chuck at either end of the dipole section. A rule calibrated in terms of frequency is pivoted at the center of the dipole section for use in adjusting the length of the dipoles and the position of the shorting bar of the matching transformer for the desired frequency. The matching transformer section is pivoted at the base so that the dipole can traverse an arc of 90 degrees to either side of the vertical position. The dipole can thus be placed in a horizontal plane, vertical plane, or any intermediate plane to coincide with the polarization of the incoming wave. The antenna is locked in the desired position by means of a knob on the antenna base. The design of the base of Antenna AT-792/URM-17A permits it to be mounted either on the Antenna Mast Section or directly on Tripod CADV-10545.

(3) R.F. Probe DT-194/URM-17A isolates the RI-FI Meter from direct power connections when measuring conducted interference on power lines up to 1000 volts AC or DC. It consists of a polished metal tube with a coaxial fitting at either end and has a characteristic impedance of 50 ohms.

(4) CABLES. — Cables carried in Case CY-2266/URM-17A consists of the six-foot six inch Power Cable Assembly CX-3810/U (6′ 6″) for connecting Power Supply PP-530A URM-17 to an external power source, the 10-foot Special Purpose Cable Assembly CADV-62481 (10′ 0″) for connecting Power Supply PP-530A/URM-17 to the RI-FI Meter IM-52A/URM-17, the 20-foot R-F Cable Assembly CG-92D/U (20′ 0″) for connecting Antenna AT-792/URM-17A to the RI-FI Meter IM-52A/URM-17, the 20-foot Remote Meter Cable Assembly CG-571/U for connecting Ammeter ME-132/U to the RI-FI Meter and the 20-foot Head Phone Extension Cable Assembly CG-572/U.

*d.* BAG CW-218/URM-17. *(See figure 1-6.)* — This case, which will be called the "Tripod Case," is a canvas bag, reinforced at top and bottom. Closure is effected by a zipper running the full length of the case and another zipper at one end around one-half the diameter. Carrying facilities include two canvas web carrying handles on the side and a canvas web shoulder carrying strap. The case is fungus and mildew resistant. Recesses in each end of the case receive the head and feet of the Tripod CADV-10545 and a pocket in the side holds the Antenna Mast Section AB-363/U.

The legs of the tripod are telescopic so that the tripod measures sixty inches when extended and approximately thirty-seven inches collapsed. The wooden legs support a stationary metal head and sleeve for mounting the Antenna Mast Section AB-363/U.

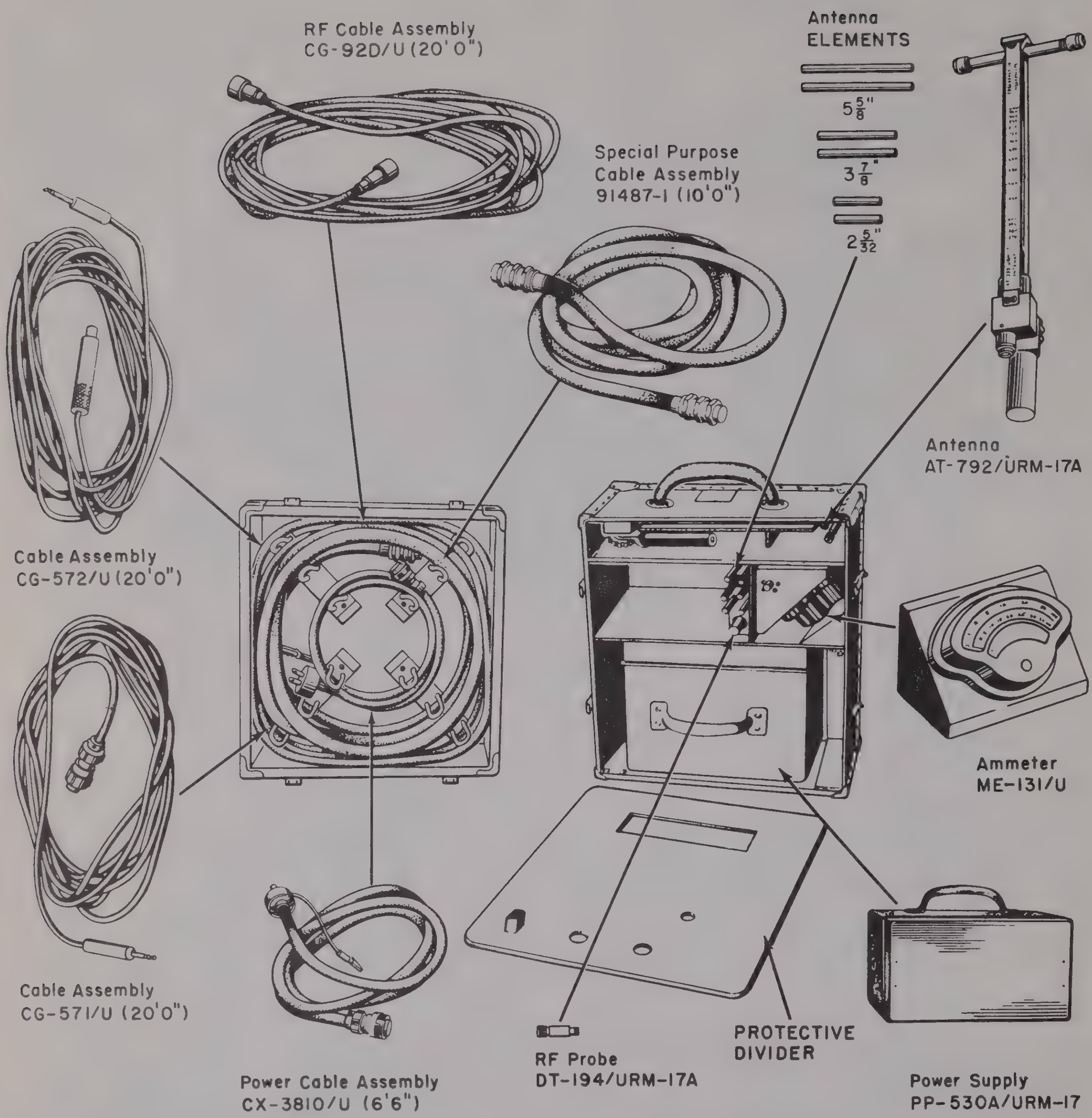



*Figure 1-4. Accessory Case Cy-2266/URM-17A, Contents Displayed*

The removable lower portion of each leg is fitted with a rubber button on one end for use on hard surfaces and a steel spike on the other end for use on soft terrain. Two knob-operated clamps on each leg lock the leg at the desired spread and extension.

An azimuth circle assembly is inverted over the sleeve at the top of the tripod head for shipment. This assembly has a bearing dial with sighting pins at zero and 180 degrees. In the field, the azimuth circle is aligned with magnetic north and locked in position. Magnetic bearings of a signal or interference source are indicated on the azimuth dial by the azimuth dial pointer on the antenna mast section.

**4. REFERENCE DATA-AN/URM-17A.**

*a.* NOMENCLATURE.—Radio Test Set AN/URM-17A.

Figure 1-5. Power Supply PP-530A/URM-17

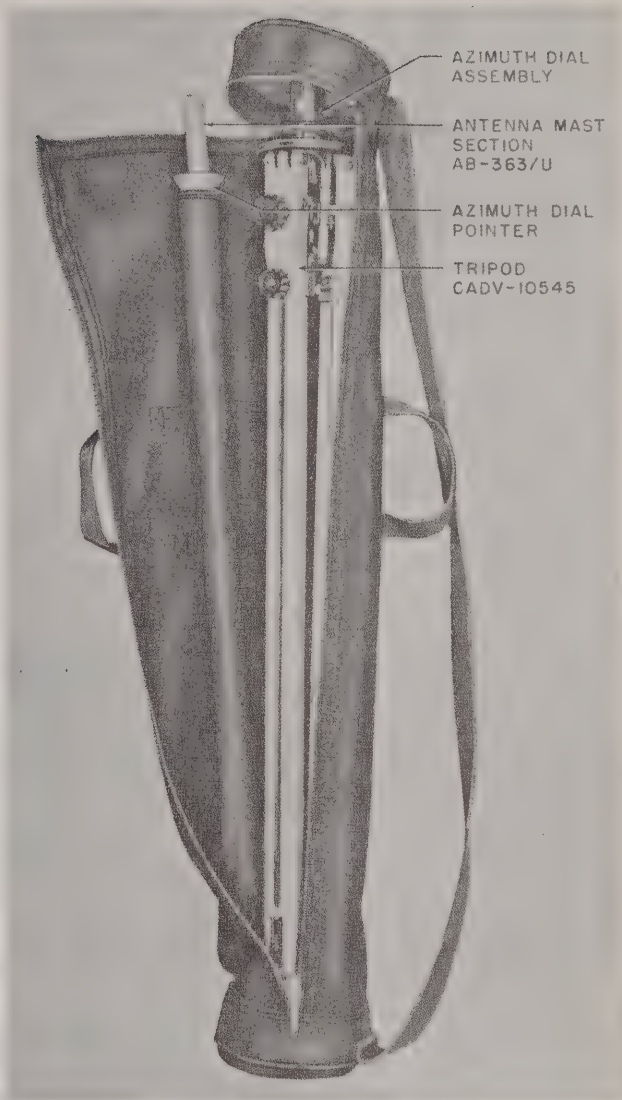



Figure 1-6. Bag CW-218/URM-17, Contents Displayed

*d.* EQUIPMENT CUBICAL CONTENTS.
(1) CRATED 10.9 cu. ft.
(2) UNCRATED: 4.9 cu. ft.

*e.* EQUIPMENT TOTAL WEIGHT.
(1) CRATED: 220 lbs.
(2) UNCRATED: 118.6 lbs.

**5. ELECTRICAL CHARACTERISTICS.**

*a.* FREQUENCY RANGE.—375 megacycles to 1000 megacycles in one band.

*b.* INPUT IMPEDANCE.—50 ohms.

*c.* INTERMEDIATE FREQUENCY.—60 megacycles.

*d.* SELECTIVITY.—The overall impulse bandwidth of Radio Test Set AN/URM-17A varies from 0.8 megacycles at a signal frequency of 1000 megacycles to 0.5 megacycles at a signal frequency of 375 megacycles. Bandwidths at 60 db down are 3.5 and 2.5 megacycles at signal frequencies of 1000 and 375 megacycles respectively. Charts provided with the equipment show actual effective bandwidth versus frequency.

*e.* IMAGE REJECTION.—40 db or better.

*f.* SPURIOUS RESPONSE REJECTION.—40 db or better.

*g.* INTERMEDIATE FREQUENCY REJECTION.—Better than 60 db.

*h.* SENSITIVITY.

(1) AS TWO-TERMINAL VOLTMETER. — Ten microvolts, based on a signal-to-noise ratio of unity.

(2) AS FIELD INTENSITY METER.—With Antenna AT-792/URM-17A tuned to resonance at signal frequency, 100 to 350 microvolts per meter depending on frequency, equipment sensitivity as a two-terminal voltmeter and a signal-to-noise ratio of unity.

*i.* SIGNAL-TO-NOISE RATIO. — Unity or better throughout frequency range of equipment, based on an equipment sensitivity of 10 microvolts as a two-terminal voltmeter.

*j.* AUDIO CHANNEL OUTPUT. — 100 milliwatts or better for 600-ohm output based on an output meter indication of 10 and R.F. signal input modulated 30 percent 1000 cps.

*k.* DYNAMIC RANGE.—20 db. Dynamic range is the overload capacity and can be defined as the ratio of the highest sine wave voltage which may be linearly amplified in the last IF stage to the sine wave voltage at that stage required for full scale deflection of the meter, the AGC voltage being held fixed at its value for full-scale deflection of the indicating meter. The dynamic range is determined, briefly, as follows: The dynamic range of this equipment is the ratio of radio frequency voltages of two different intensities within

the frequency range of the equipment impressed in turn at resonance on the input of the equipment. The lesser of these two voltages is that which will produce full-scale deflection of the indicating meter. The greater of these two voltages is that which will produce an increase in detector output that causes a departure of exactly 10% from linearity. During the application of this greater voltage, the AGC voltage is held constant by independent means at the value obtained at full scale meter indication. This test is performed in all positions of the step attenuator, and the smallest ratio so obtained is taken as the dynamic range of the equipment.

*l.* AC POWER SUPPLY REQUIREMENTS.

(1) VOLTAGE:—105 - 125, 210 - 250.

(2) PHASE:—Single.

(3) FREQUENCY:—50 to 1600 cycles per second.

(4) POWER CONSUMPTION:—115 watts at 115 volts, 60 cycles.

(5) POWER FACTOR: — 0.935 at 115 volts, 60 cycles.

*m.* BATTERIES REQUIRED WHEN AC IS NOT AVAILABLE.—When a separate battery pack is used in place of Power Supply PP-530A/URM-17, use special-purpose battery cable CADV 62482 (2′0″) as used with Radio Test Set AN/URM-6 (not supplied with this contract) and the following batteries:

(1) FILAMENT.—6.3 volts at 3.63 amperes (at 6V, 3.5 amperes); use Battery, storage, Navy Type 6V-SBMD-175 AH. Federal Standard Stock Catalog No. 17-B-9536.

(2) PLATE.—225 volts at approximately 107 milliamperes; use five Battery JAN BA-26, Navy Type 19004A, Commercial Type Burgess #21308.

(3) BIAS.—22.5 volts at approximately 6.9 milliamperes; use one section af a 45 volt battery as in (2) above or one 22.5-volt Battery JAN-BA-2, Navy Type 19033.

TABLE 1-1. EQUIPMENT SUPPLIED

| QUANTITY PER EQUIPMENT | NAME OF UNIT | AN DESIGNATION | OVERALL DIMENSIONS Inches | | | VOLUME CU. FT. | WEIGHT POUNDS |
|---|---|---|---|---|---|---|---|
| | | | HEIGHT | WIDTH | DEPTH | | |
| 1 | CASE (Transit) containing: | CY-866/URM-17 | 16¼ | 23¾ | 10⅞ | — | Without contents: 25 With contents: 58 |
| 1 | RADIO INTERFERENCE-FIELD INTENSITY METER | IM-52A/URM-17 | 9-3/16 | 19-13/16 | 10⅜ | — | 30 — |
| 1 | HEADPHONE | H-132/U | — | — | — | — | — |
| 1 | CHART SET | PT-430/URM-17A | — | — | — | — | — |
| 2 | INSTRUCTION BOOK | NAVSHIPS 93083A | — | — | — | — | |
| 1 | CASE (Accessory) containing: | CY-2266/URM-17A | 18⅜ | 15⅝ | 10¾ | — | Without contents: 17 With contents: 41 |
| 1 | POWER SUPPLY | PP-530A/URM-17 | 7-31/32 | 9-29/32 | 19¾ | — | 16 |
| 1 | ANTENNA | AT-792/URM-17A | — | — | — | — | — |
| 1 | R.F. PROBE | DT-194/URM-17A | — | — | — | — | — |
| 1 | POWER CABLE ASSEMBLY | CX-3810/U (6′ 6″) | — | — | — | — | — |
| 1 | SPECIAL PURPOSE CABLE ASSEMBLY | CADV-62481 (10′ 0″) | — | — | — | — | — |
| 1 | R.F. CABLE ASSEMBLY | CG-92D/U (20′ 0″) | — | — | — | — | — |
| 1 | AMMETER | ME-131/U | 4⅝ | 4¾ | 6⅜ | — | — |
| 1 | CABLE ASSEMBLY (Remote Meter) | CG-571/U (20′ 0″) | — | — | — | — | — |
| 1 | CABLE ASSEMBLY (Headphone Extension) | CG-572/U (20′ 0″) | — | — | — | — | — |
| 1 | BAG (Tripod) containing: | CW-218/URM-17 | 39¾ | 6¼ dia. | — | 0.7 | Without contents: 3¼ With contents: 10¼ |
| 1 | TRIPOD | CADV-10545 | — | — | — | — | — |
| 1 | ANTENNA MAST SECTION | AB-363/U | — | — | — | — | — |
| 1 | AZIMUTH DIAL ASSEMBLY | CADV-90044-1 | — | — | — | — | — |
| 1 | AZIMUTH DIAL POINTER | CADV-90045-1 | — | — | — | — | — |

TABLE 1-2. EQUIPMENT REQUIRED BUT NOT SUPPLIED

| QUANTITY PER EQUIPMENT | NAME OF UNIT | AN DESIGNATION | NAVY TYPE | REQUIRED USE | REQUIRED CHARACTERISTICS |
|---|---|---|---|---|---|
| 1 | OBSERVER COMPASS | Mark 1 Mod 0 | | Alignment of dipole antenna with magnetic north | Portable magnetic compass with sighting facilities |

TABLE 1-3. SHIPPING DATA

| SHIPPING BOX NO. | CONTENTS | | OVERALL DIMENSIONS Inches | | | VOLUME | WEIGHT |
|---|---|---|---|---|---|---|---|
| | NAME | DESIGNATION | HEIGHT | WIDTH | DEPTH | | |
| 1 | RADIO TEST SET | AN/URM-17A | 17¼ | 47 | 21¼ | 10.9 cu. ft. | 220 lbs. |

TABLE 1-4. ELECTRONIC TUBE COMPLEMENT

| TUBE TYPE | SYMBOLS INVOLVED | QUANTITY PER EQUIPMENT | RI-FI METER | POWER SUPPLY PP-530A/URM-17 | DESCRIPTION |
|---|---|---|---|---|---|
| 5726/6AL5 | V-110, V-116 | 2 | 2 | | Duodiode |
| 6AR5 | V-109 | 1 | 1 | | Power Pentode |
| 6080WA/6AS7G | V-301 | 1 | | 1 | Low-Mu Twin Power Triode |
| 6BH6 | V-104, V-105, V-106, V-107, V-108, V-111, V-114, V-302 | 8 | 7 | 1 | Sharp-Cutoff Pentode |
| 6135/6C4 | V-112, V-113 | 2 | 2 | | High Frequency Power Triode |
| 6F4 | V-102, V-103 | 2 | 2 | | Oscillator Triode |
| 5651 | V-303 | 1 | | 1 | Gaseous Voltage Regulator |
| 9005 | V-101 | 1 | 1 | | U.H.F. Diode |
| 5814/12AU7 | V-115 | 1 | 1 | | Twin Triode Amplifier |
| GL-6299 | V-117 | 1 | 1 | | U.H.F. Triode Amplifier |
| | Total Quantities | 20 | 17 | 3 | |

# SECTION 2

# THEORY OF OPERATION

## 1. GENERAL THEORY OF OPERATION.

*(See figures 2-1 and 2-2)*

*a.* Throughout this section, refer to the complete block diagram figure 2-1, which shows in detail the relationship of the various circuits within the RI-FI Meter.

*b.* RF INPUT DEVICES. *(See figure 2-2.)*—Input devices for Radio Test Set AN/URM-17A include the dipole antenna, and R-F Probe.

Meter indications are modified by the pickup factor of the dipole Antenna AT-792/URM-17A, as determined from the calibration chart set. The R.F. Probe DT-194/URM-17A is used for a 50-ohm to 50-ohm match for coaxial lines where DC isolation is necessary.

*c.* RADIO INTERFERENCE-FIELD INTENSITY METER IM-52A/URM-17.—The RI-FI Meter includes a superheterodyne radio receiver covering the 375 to 1000 megacycle portion of the radio frequency spectrum. It also contains internal means for calibrating or standardizing its gain.

Measurements can be made with the RI-FI Meter in terms of the peak value of the signal or interference— the PEAK function of the meter—, in terms of a weighted value— the QP (quasi-peak) function—, or in terms of the average value— the FI (field intensity) function. The meter is standardized in the CAL position of the function switch at a predetermined frequency of approximately 800 megacycles. Measurements are obtained by switching the function switch to the function desired.

The RI-FI Meter indicating meter scale is directly calibrated for a two-decade, approximately logarithmic range of 1-100 microvolts (top scale), and an approximately linear 0-40 db (bottom scale) range.

Since the inherent sensitivity of the RI-FI Meter is 10 microvolts rather than one microvolt as implied by the meter markings, a 10 to 1 correction factor is required. This has been automatically provided by raising the attenuation markings of each attenuator step 20 db above its actual value. The built-in attenuator provides *full-scale* values as follows:

| | | |
|---|---|---|
| CAL | X10 | X$10^2$ |
| 1000$\mu$v | 1000$\mu$v | 10,000$\mu$v |
| 60 db | 60 db | 80 db |
| X$10^3$ | X$10^4$ | X$10^5$ |
| 100,000$\mu$v | 1 volt | 10 volts |
| 100 db | 120 db | 140 db |

*d.* SIGNAL CHANNEL IN RADIO INTERFERENCE-FIELD INTENSITY METER IM-52A/URM-17.—The signal channel, as is evident in figure 2-2, closely resembles a superheterodyne receiver in its RF, IF, and AF portions, but differs from most superheterodyne receivers in its provision for attenuation and measurement of detector output.

The RF signal or interference (hereafter called signal) as picked up by the antenna or probe is delivered to the RF INPUT receptacle. The RF signal passes through the RF stage, and is mixed with the local oscillator frequency in the mixer stage, to produce the intermediate frequency of 60 megacycles. The IF signal is amplified in six IF stages, and demodulated in the detector stage. The demodulated signal is acted upon by the meter detector weighting circuits and applied to the VTVM stage, thus actuating the meter. The audio components are subsequently amplified and delivered to the headphone jacks.

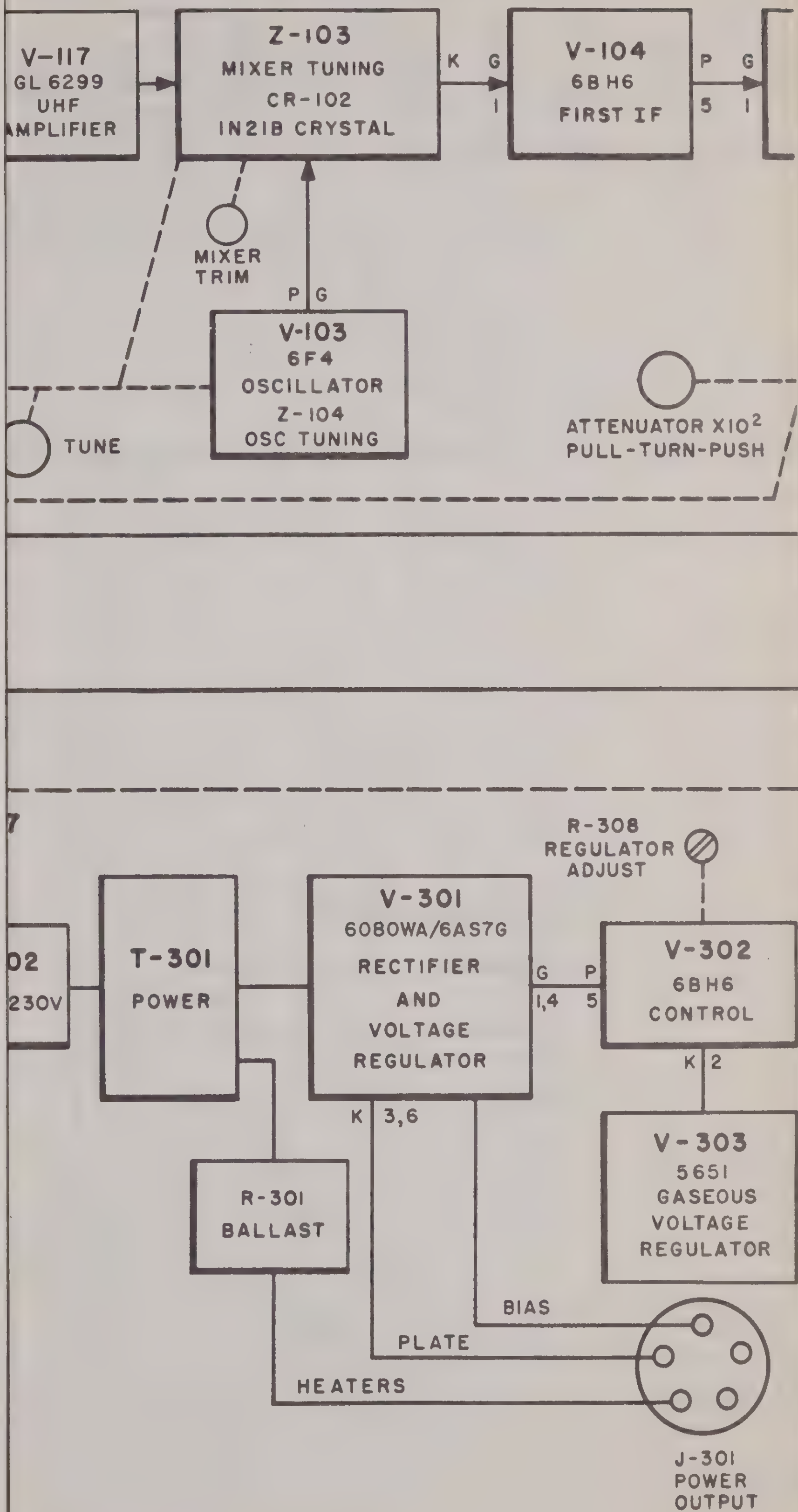
The internal calibrator supplies a sine wave calibrating voltage that follows the same signal path from RF stage to indicating meter. With the calibrator on, the gain of the IF section is adjusted, by means of the CAL control, to the standardized indication of 100 on the indicating meter scale.

The built-in step attenuator provides the following step ratios: 1, 10, 100, 1000, and 10,000. The first step of attenuation is obtained in the IF amplifier and the remainder in the input to the RF stage.

## 2. CIRCUIT ANALYSIS, RADIO INTERFERENCE-FIELD INTENSITY METER IM-52A/URM-17.

Individual circuits in the RI-FI Meter are described in the succeeding subparagraphs, with the exception of the detector weighting circuits. These circuits are treated separately in paragraph 3.

ENSITY METER IM-52A/URM-17



# SECTION 2

# THEORY OF OPERATION

## 1. GENERAL THEORY OF OPERATION.

*(See figures 2-1 and 2-2)*

*a.* Throughout this section, refer to the complete block diagram figure 2-1, which shows in detail the relationship of the various circuits within the RI-FI Meter.

*b.* RF INPUT DEVICES. *(See figure 2-2.)*—Input devices for Radio Test Set AN/URM-17A include the dipole antenna, and R-F Probe.

Meter indications are modified by the pickup factor of the dipole Antenna AT-792/URM-17A, as determined from the calibration chart set. The R.F. Probe DT-194/URM-17A is used for a 50-ohm to 50-ohm match for coaxial lines where DC isolation is necessary.

*c.* RADIO INTERFERENCE-FIELD INTENSITY METER IM-52A/URM-17.—The RI-FI Meter includes a superheterodyne radio receiver covering the 375 to 1000 megacycle portion of the radio frequency spectrum. It also contains internal means for calibrating or standardizing its gain.

Measurements can be made with the RI-FI Meter in terms of the peak value of the signal or interference— the PEAK function of the meter—, in terms of a weighted value— the QP (quasi-peak) function—, or in terms of the average value— the FI (field intensity) function. The meter is standardized in the CAL position of the function switch at a predetermined frequency of approximately 800 megacycles. Measurements are obtained by switching the function switch to the function desired.

The RI-FI Meter indicating meter scale is directly calibrated for a two-decade, approximately logarithmic range of 1-100 microvolts (top scale), and an approximately linear 0-40 db (bottom scale) range.

Since the inherent sensitivity of the RI-FI Meter is 10 microvolts rather than one microvolt as implied by the meter markings, a 10 to 1 correction factor is required. This has been automatically provided by raising the attenuation markings of each attenuator step 20 db above its actual value. The built-in attenuator provides *full-scale* values as follows:

| | | |
|---|---|---|
| CAL<br>1000$\mu$v<br>60 db | X10<br>1000$\mu$v<br>60 db | X10$^2$<br>10,000$\mu$v<br>80 db |
| X10$^3$<br>100,000$\mu$v<br>100 db | X10$^4$<br>1 volt<br>120 db | X10$^5$<br>10 volts<br>140 db |

*d.* SIGNAL CHANNEL IN RADIO INTERFERENCE-FIELD INTENSITY METER IM-52A/URM-17.—The signal channel, as is evident in figure 2-2, closely resembles a superheterodyne receiver in its RF, IF, and AF portions, but differs from most superheterodyne receivers in its provision for attenuation and measurement of detector output.

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The internal calibrator supplies a sine wave calibrating voltage that follows the same signal path from RF stage to indicating meter. With the calibrator on, the gain of the IF section is adjusted, by means of the CAL control, to the standardized indication of 100 on the indicating meter scale.

The built-in step attenuator provides the following step ratios: 1, 10, 100, 1000, and 10,000. The first step of attenuation is obtained in the IF amplifier and the remainder in the input to the RF stage.

## 2. CIRCUIT ANALYSIS, RADIO INTERFERENCE-FIELD INTENSITY METER IM-52A/URM-17.

Individual circuits in the RI-FI Meter are described in the succeeding subparagraphs, with the exception of the detector weighting circuits. These circuits are treated separately in paragraph 3.

NAVSHIPS 93083A AN/URM-17A
NAVSHIPS 93083A AN/URM-17A
NAVSHIPS 93083A AN/URM-17A

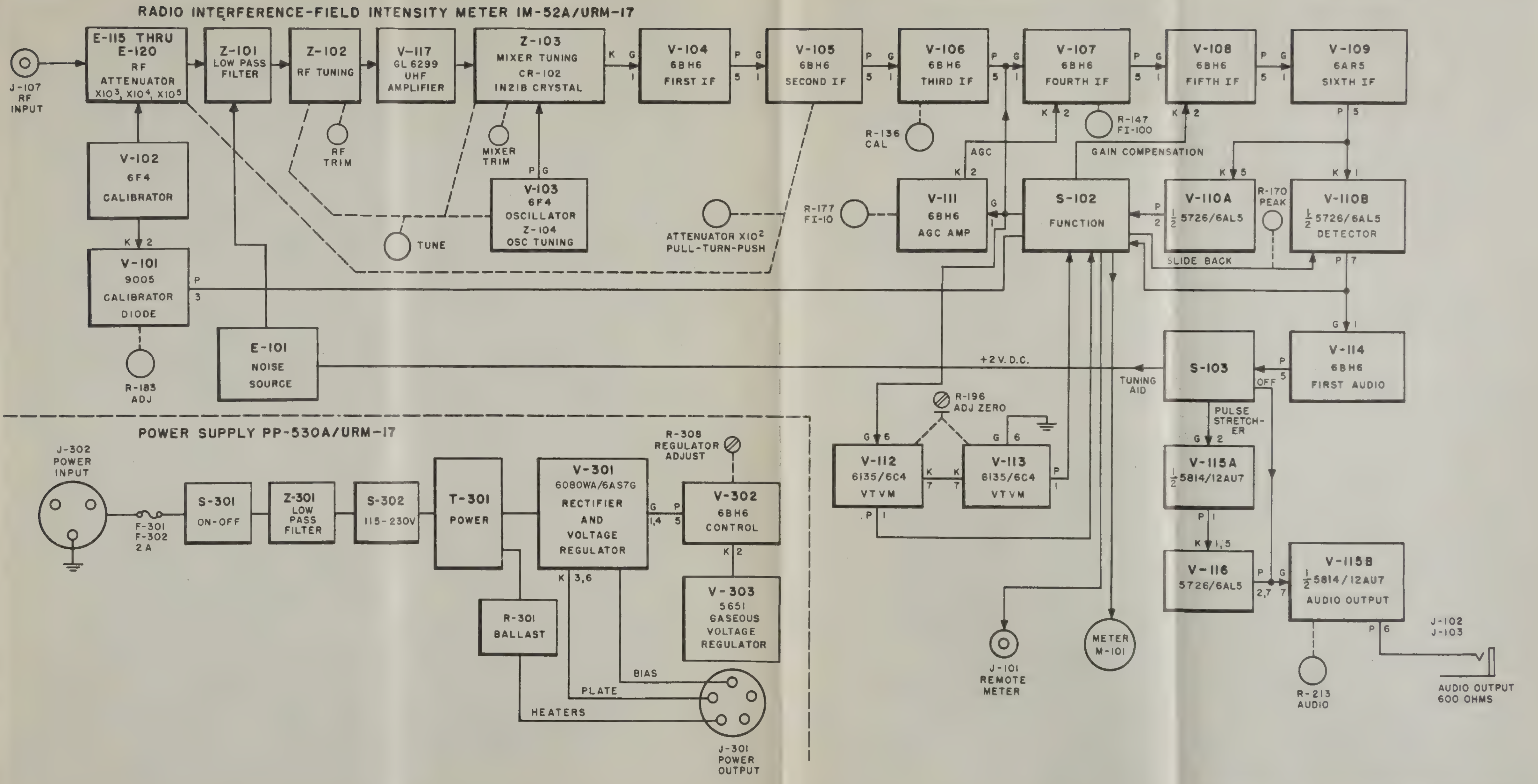




Figure. 2-1. Radio Test Set AN/URM-17A, Block Diagram

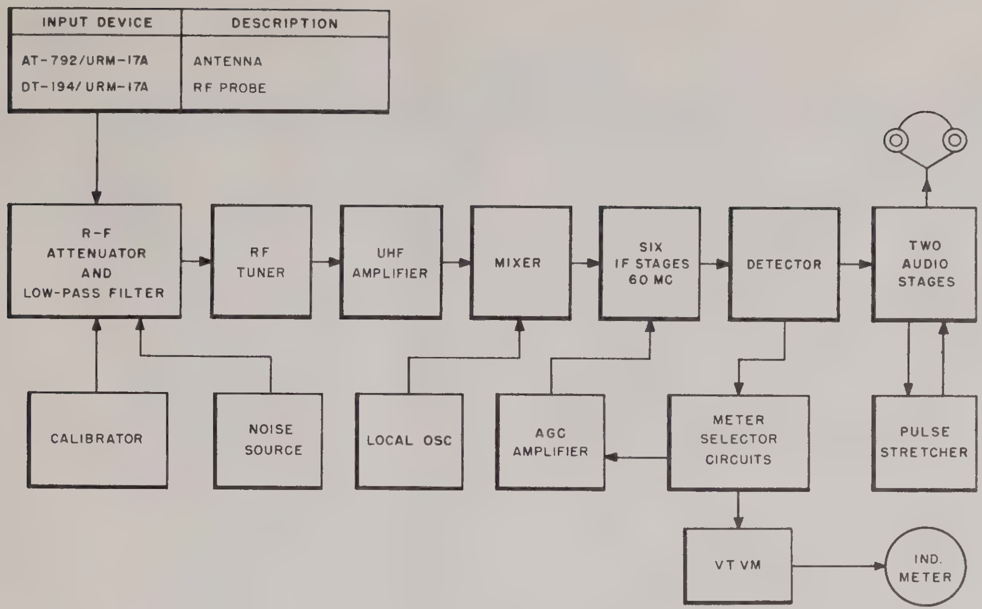



**Figure 2-2. Radio Test Set AN/URM-17A, Simplified Block Diagram**

*a.* R-F ATTENUATOR. *(See figure 2-3.)*—The R-F attenuator is composed of three individual T-section resistive networks arranged in compact metal tubes three inches long and 9/16 inches in diameter. A separate tube provides for calibration injection and an additional tube provides a straight-through section for zero attenuation. These six tubes, E-115 through E-120, are turret-mounted about a central shaft, which imparts rotational and linear motion to the assembly. Thus, selection of each step of attenuation requires a PULL-TURN-PUSH sequence. Smooth, positive positioning is accomplished by a spring loaded detent.

The resistive elements sealed in the tubes are special one-watt resistors consisting of thin metallic films on ceramic tubes or discs. They maintain their precision resistive values at DC to 1000 megacycles.

In the CAL and X10 positions of the RF attenuator, two pins on the turret assembly actuate the coaxial switch S-104 to apply the calibrator output directly to the Low-Pass Filter Z-101 and simultaneously terminates the R-F input from the antenna through 50 ohms (E-115) to ground. *(See figure 2-3.)*

*b.* INPUT FILTER AND NOISE SOURCE. *(See figure 2-4.)*—The input filter Z-101 is a transmission line low-pass filter for attenuating frequencies above the tuning range of the RI-FI Meter. Nominal cut-off frequency of the filter is 1100 megacycles.

The noise-source E-101 is a vibrating reed, synchronous vibrator having a natural period of 115 cycles per second. In the TUNING AID position of S-103, 2 volts DC is applied to the vibrator coil. The spark discharge at the vibrating contacts produces conducted impulse-type RF interference in the core and frame of the vibrator. An injection probe in close proximity to the

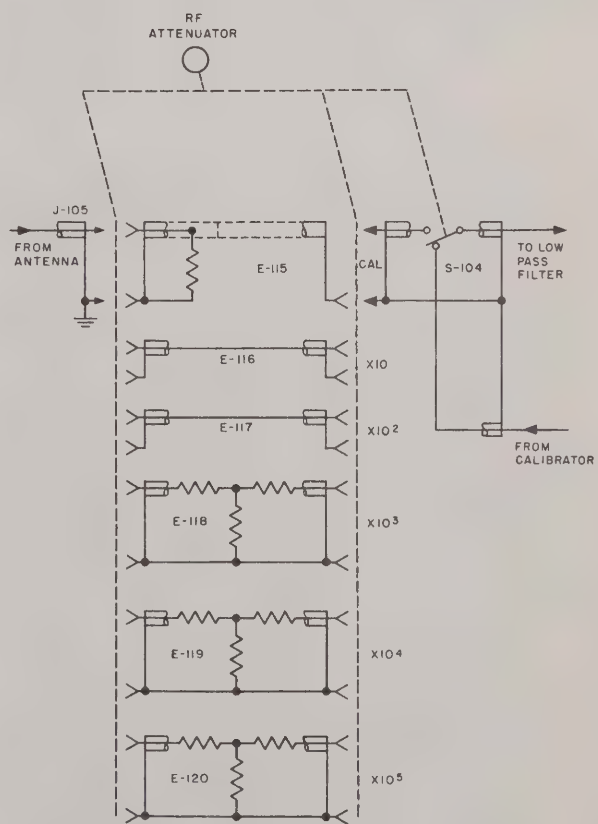



**Figure 2-3. Radio Interference-Field Intensity Meter IM-52A/URM-17, Schematic Diagram of the RF Attenuator.**

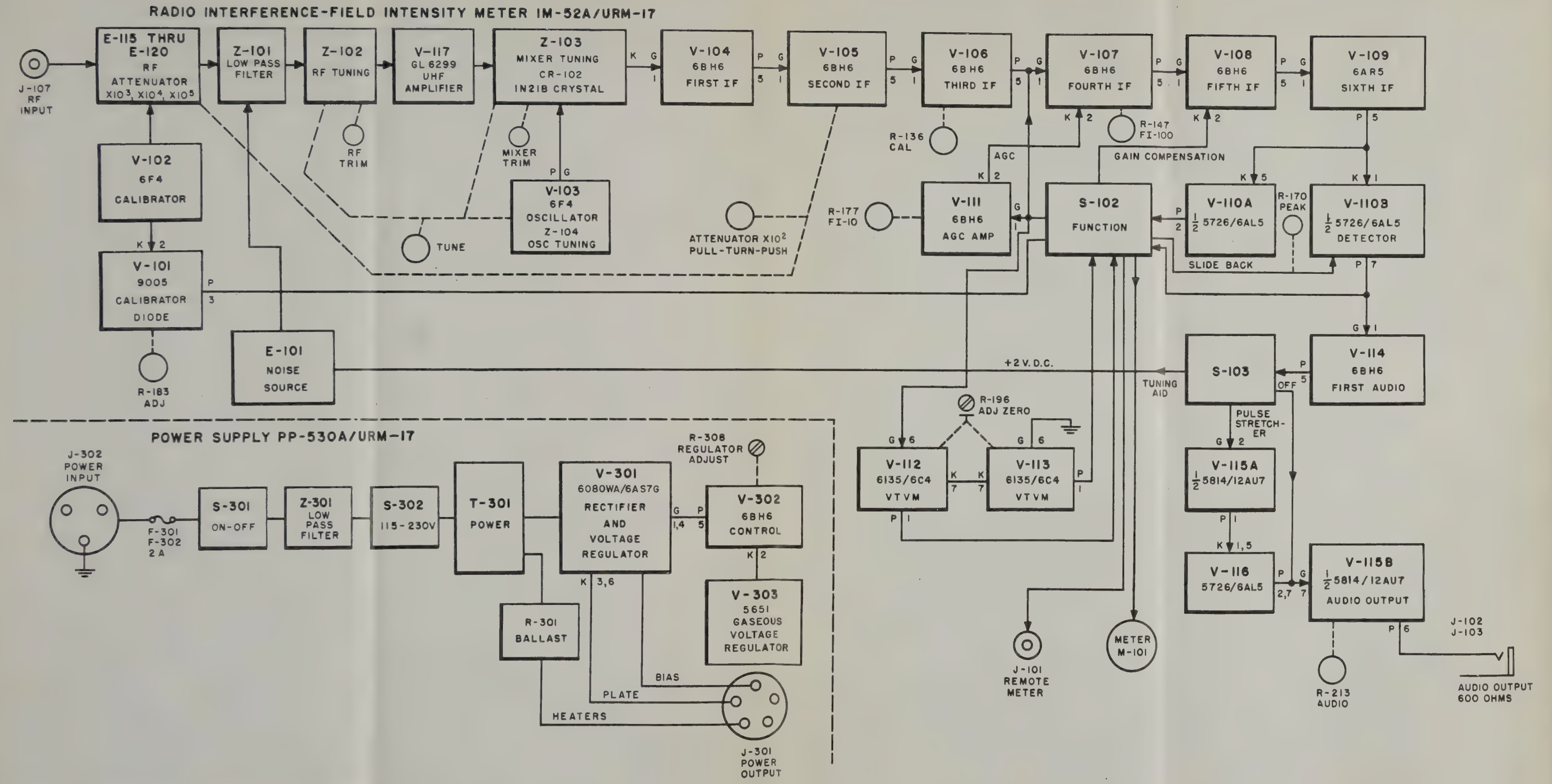



Figure 2-1. Radio Test Set AN/URM-17A, Block Diagram

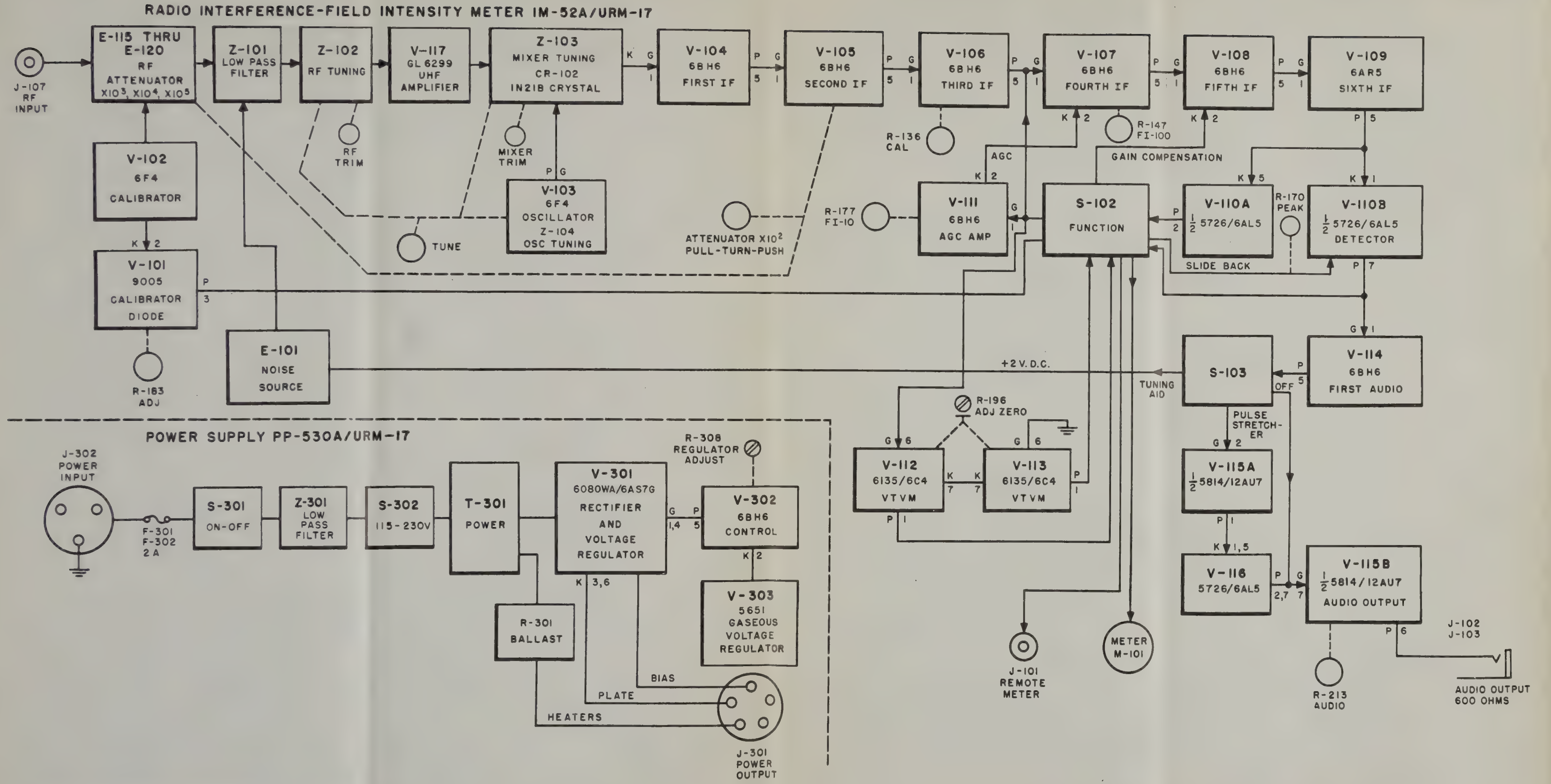



*Figure 2-1. Radio Test Set AN/URM-17A, Block Diagram*

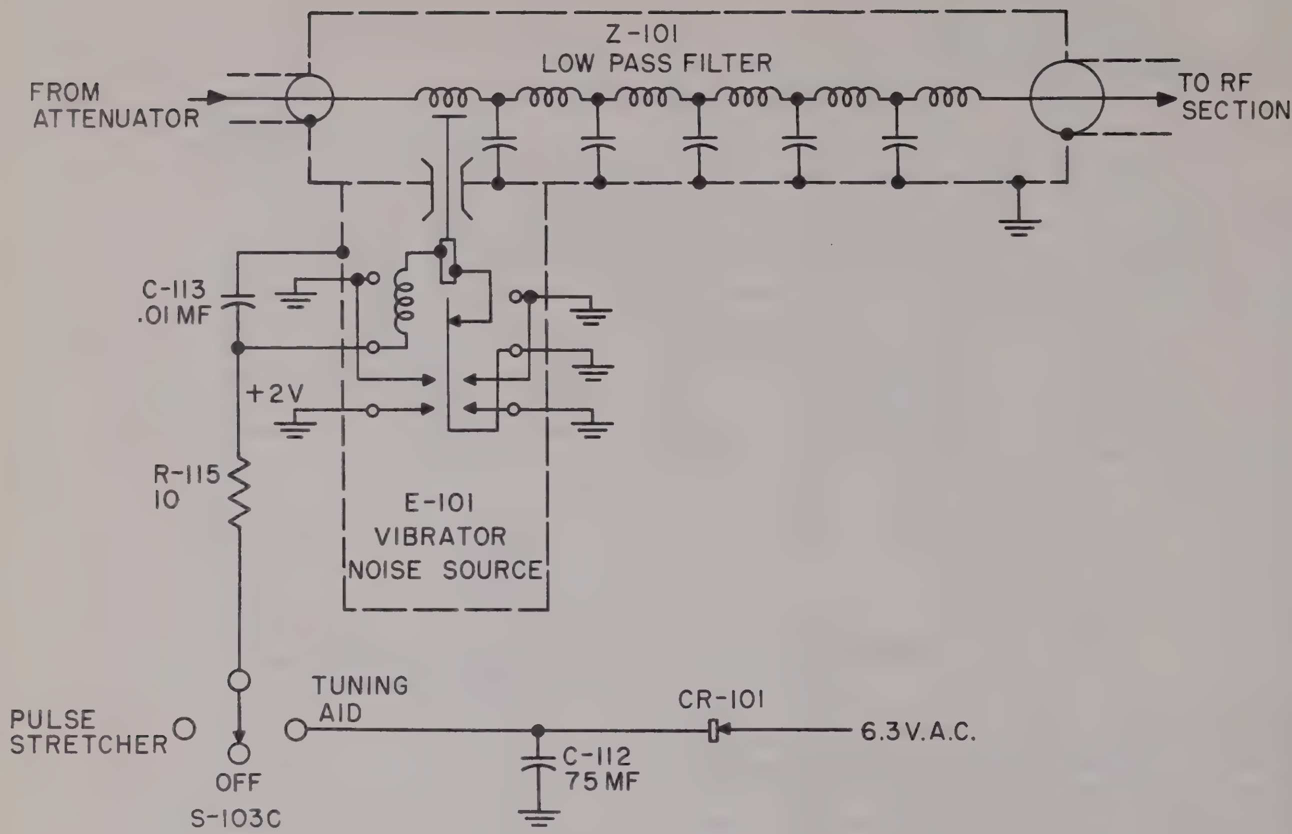



**Figure 2-4. Radio Interference-Field Intensity Meter IM-52A/URM-17, Schematic Diagram of the Input Filter and Noise Source**

inner conductor of the low pass filter is connected to the vibrator frame. The probe is threaded for control of the amount of noise injection.

*c.* RF SECTION. *(See figure 2-5.)*—The RF section consists of butterfly-tuned RF, mixer, and oscillator stages in a shielded box having two compartments. The three butterfly assemblies are ganged for operation by one front panel knob. Separate knobs for RF and mixer trim control operate cams in the ganged mechanism.

The R-F Tuning Circuit Z-102 is coupled to the Mixer Tuning Circuit Z-103 by R-F Amplifier V-117. The type GL-6299 triode (V-117) is used which is of planar construction, in which the cathode, grid and plate form three parallel planes as opposed to axial construction. Arrangement of the electrodes in this manner considerably reduces interelectrode capacitance and electron transit time thus permitting operation in the UHF region. Physically the tube is mounted on the shield between the R-F and Mixer compartments and is connected with its grid grounded to the shield. This grounded grid circuit configuration provides the maximum of isolation between the R-F and Mixer tuned circuits. R-F filters in the heater and plate supply leads isolate the R-F amplifier from the remaining receiver circuits. Inductive coupling is used between the oscillator and mixer stages, which are in the same compartment.

The local oscillator is a modified Colpitts oscillator using a type 6F4 acorn triode operating at a frequency 60 megacycles below the RF input signal. Proper tracking is assured by C-109, a trimmer for the local oscillator at the top end of the band. The plate-to-cathode and grid-to-cathode inter-electrode capacitances form a capacitive voltage-dividing network characteristic of the Colpitts circuit. Chokes in the cathode and filament circuits minimize the shunting effect across the grid-to-cathode inter-electrode capacitance. RF filters in the plate and filament supply leads isolate the oscillator from the rest of the receiver.

The crystal diode CR-102 is tapped across a portion of the mixer butterfly to reduce the loading on the butterfly. C-107 completes the RF path through CR-102 and acts as a blocking capacitor for the DC component of the rectified RF signal. The RF filter choke L-114 is self-resonant at approximately 340 megacycles to filter RF out of the IF input.

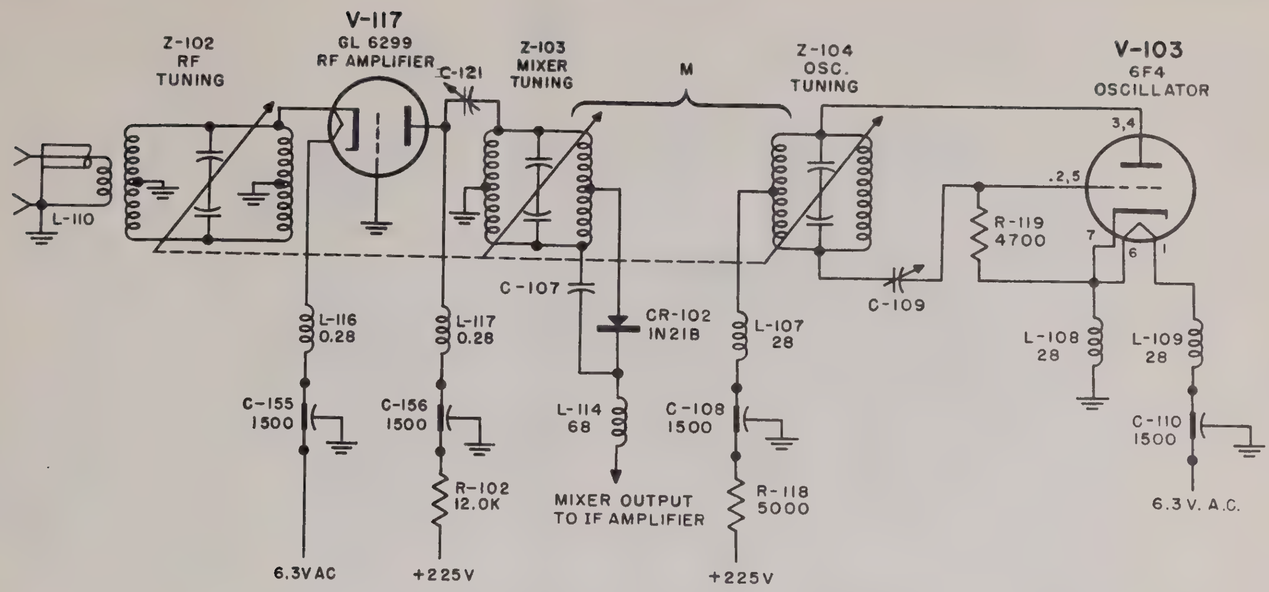



**Figure 2-5. Radio Interference-Field Intensity Meter IM-52A/URM-17, Schematic Diagram of the R.F. Section**

*d.* CALIBRATOR CIRCUIT. *(See figure 2-6.)*—A calibrator circuit using a 6F4 acorn triode in a modified Colpitts oscillator is used to supply a fixed 800-megacycle calibrating voltage. The calibrator is operative in the ADJ and CAL positions of the function switch. In all other positions the plate voltage supply to the tube is removed. The calibrator output is connected through coaxial switch S-104 of the R-F attenuator to the receiver input.

The resonant circuit is the tuned line Z-105, comprising two plates separated by air dielectric. An approximately 25-megacycle variation of the output frequency is made by means of C-104. The calibrator output level is adjusted by varying the relative position of the window opening which exposes the pick-up loop L-115 to the calibrator oscillator compartment. Fine control of the calibrator output is made by the front panel control ADJ R-183, which varies the plate voltage of the oscillator tube.

The diode V-101 is tapped across a portion of the oscillator tuned circuit to furnish a DC voltage proportional to oscillator output. The RF component of the rectifier output is by-passed and filtered out by C-102, L-102, C-103, C-126, and L-113. In the ADJ position of the function switch the DC component is applied to the indicating meter. In the CAL position it is applied to a dummy load, and in all other positions the diode load is open-circuited.

In operation, the calibrator level is established as follows: With the function switch in the ADJ position, the ADJ control R-183 is adjusted for a reading of 10 on the indicating meter. The SERIES METER control R-184 varies the diode load resistor comprising the series resistor and meter resistance, to obtain the meter reading of 10 at a center-position of the ADJ control knob. The gain of the receiver can then be standardized by placing the function switch in the CAL position and adjusting the CAL control knob for a reading of 100 on the indicating meter.

*e.* FIRST AND SECOND IF AMPLIFIER STAGES. *(See figure 2-7.)*—The IF stages are all tuned to 60 megacycles. Permeability-tuned transformer coupling is used between all stages. The plate voltage and heater voltage supplies to each IF stage are filtered to reduce the common impedance between stages, thus preventing feedback. To afford attenuation, gain, and AGC features in the IF strip, several of the IF stages are operated on various levels of tube operating bias. Compensation is required for the resulting Miller Effect, which is evidenced by a certain amount of detuning due to variation, with signal strength, of the capacitance across the tuned grid circuit. In the method used here, an unbypassed cathode resistor in combination with a capacitance from grid to cathode of a tube introduces feedback between the cathode and grid circuits which in effect reduces the capacitance between grid and ground with increasing transconductance, and thereby tends to compensate for the undesired detuning.

Referring to figure 2-7, the first IF is a straight amplifier using a 6BH6 pentode. The mixer output to the first IF stage is tapped on the input transformer T-101 to maintain an impedance match for the mixer crystal CR-102 at 300 ohms. Automatic bias is obtained from the cathode bias resistor R-120, by-passed by C-117. A dropping resistor R-121 and by-pass capacitor C-118 are used in the screen circuit.

The second IF stage is identical to the first stage except for the provisions for one step of attenuation. The

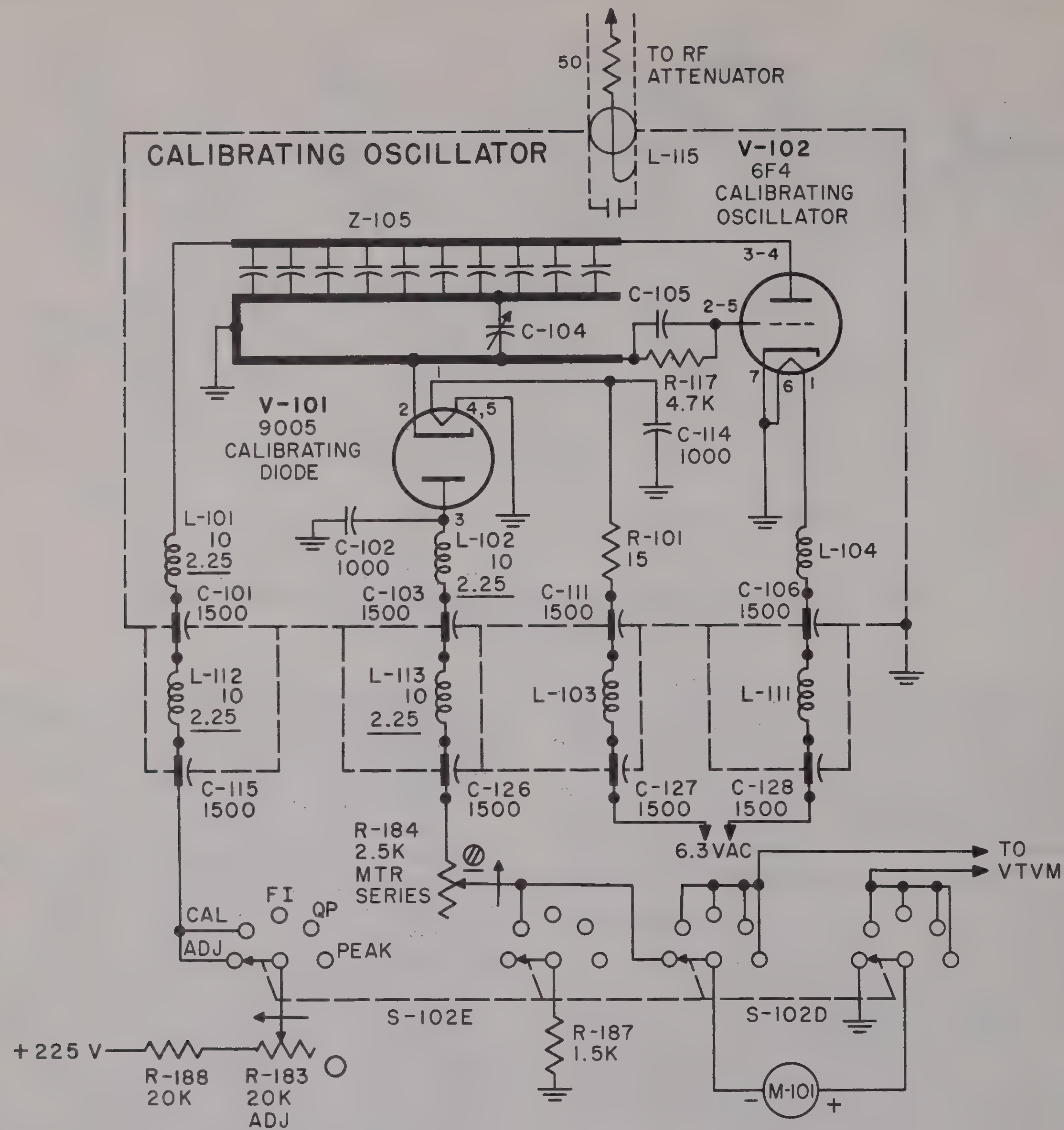



*Figure 2-6. Radio Interference-Field Intensity Meter IM-52A/URM-17, Schematic Diagram of the Calibrator Circuit*

received signal is not attenuated at the second IF stage when the attenuator knob is in the CAL and X10 positions. In this case the cathode of V-105 is connected through the cathode bias resistors R-123 and R-131 and the IF filter Z-106 to ground. In all other positions of the attenuator knob, the switch S-101 is opened and the cathode circuit of V-105 is connected to the voltage divider R-133 and R-132 for the application of fixed bias to the stage and a consequent drop in tube gain. Miller Effect compensation required due to changes in tube operating bias is accomplished by R-123 and C-122.

*f.* THIRD AND FOURTH IF AMPLIFIER STAGES. *(See figure 2-8.)*—The third IF stage differs from the preceding stages by the addition of a manual gain control labelled CAL. This control, R-136, selects a fixed cathode bias voltage for V-106. In this fashion the gain of the RI-FI Meter is adjusted against the sine wave calibrating voltage source to obtain a meter reading of 100 when the input is 100 units. As in previous stages, Miller Effect compensation is accomplished by R-134 and C-132. Heater, bias, and plate supply voltages to the stage are filtered to prevent feedback.

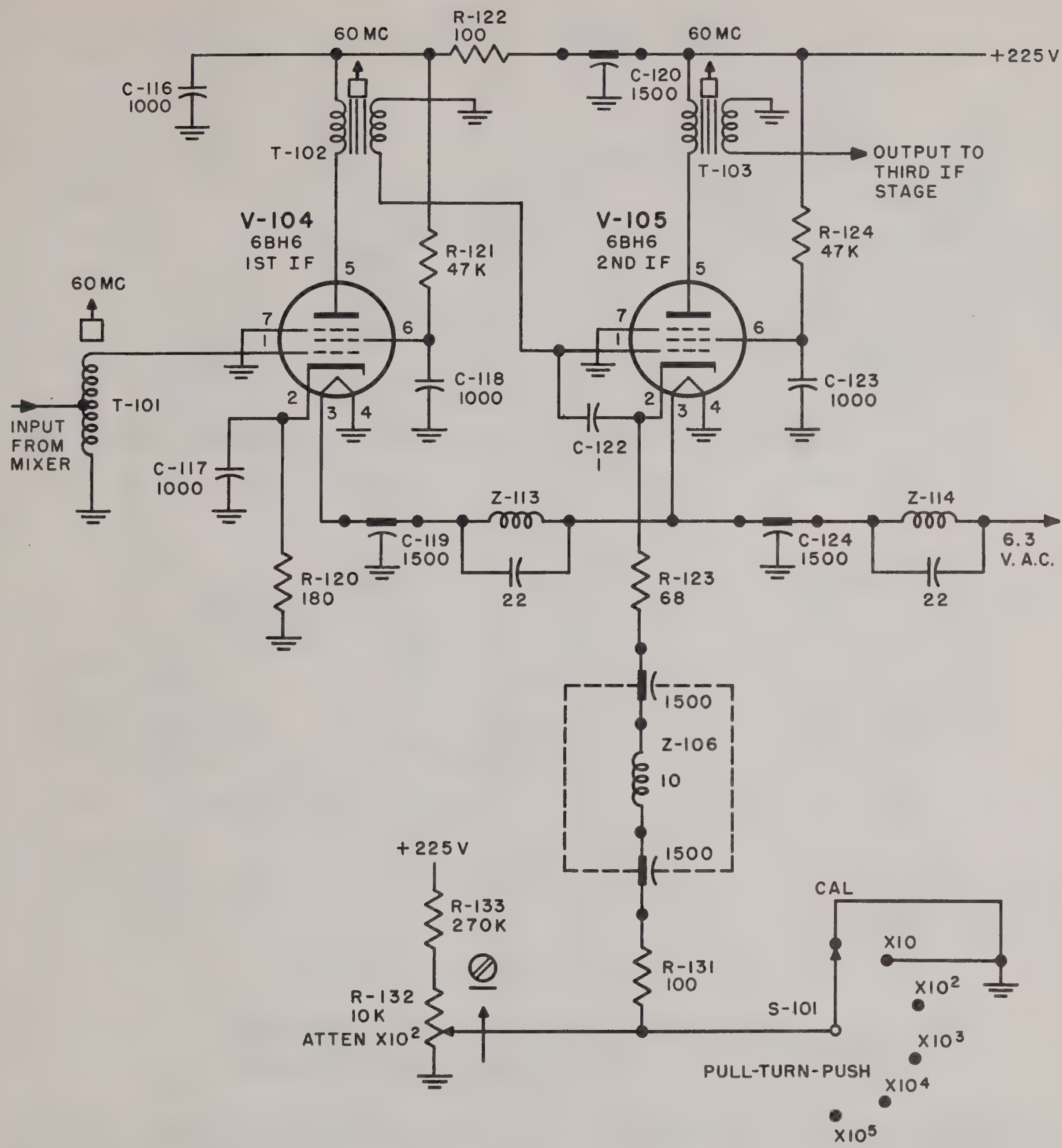



***Figure 2-7. Radio Interference-Field Intensity Meter IM-52A/URM-17, Schematic Diagram of the First and Second IF Amplifier Stages***

The fourth IF stage is the AGC-controlled stage, with AGC voltage applied to the grid of V-107 for automatic gain control of the IF strip. R-140 and C-137 compensate for the Miller Effect arising from the changes in tube operating bias by aplication of AGC voltage. Cathode bias for this stage is adjusted by R-147 to obtain meter scale tracking at the top of the range in the FI function. R-151 is shunted across the secondary of T-105 to load the coil and widen the bandwidth at this stage.

The AGC voltage derived from the diode load resistor is negative with respect to a point called circuit ground. Circuit ground is the return circuit from diode load to diode cathode. The indicating meter scale is approximately logarithmic, and the AGC amplifier V-111 is used to compress the upper half of the meter scale by altering the AGC voltage at V-107 grid. V-111 is connected in a voltage divider from B+ to ground. The screen potential is adjusted by R-177 so that V-111 begins to cut off when an AGC voltage equivalent to

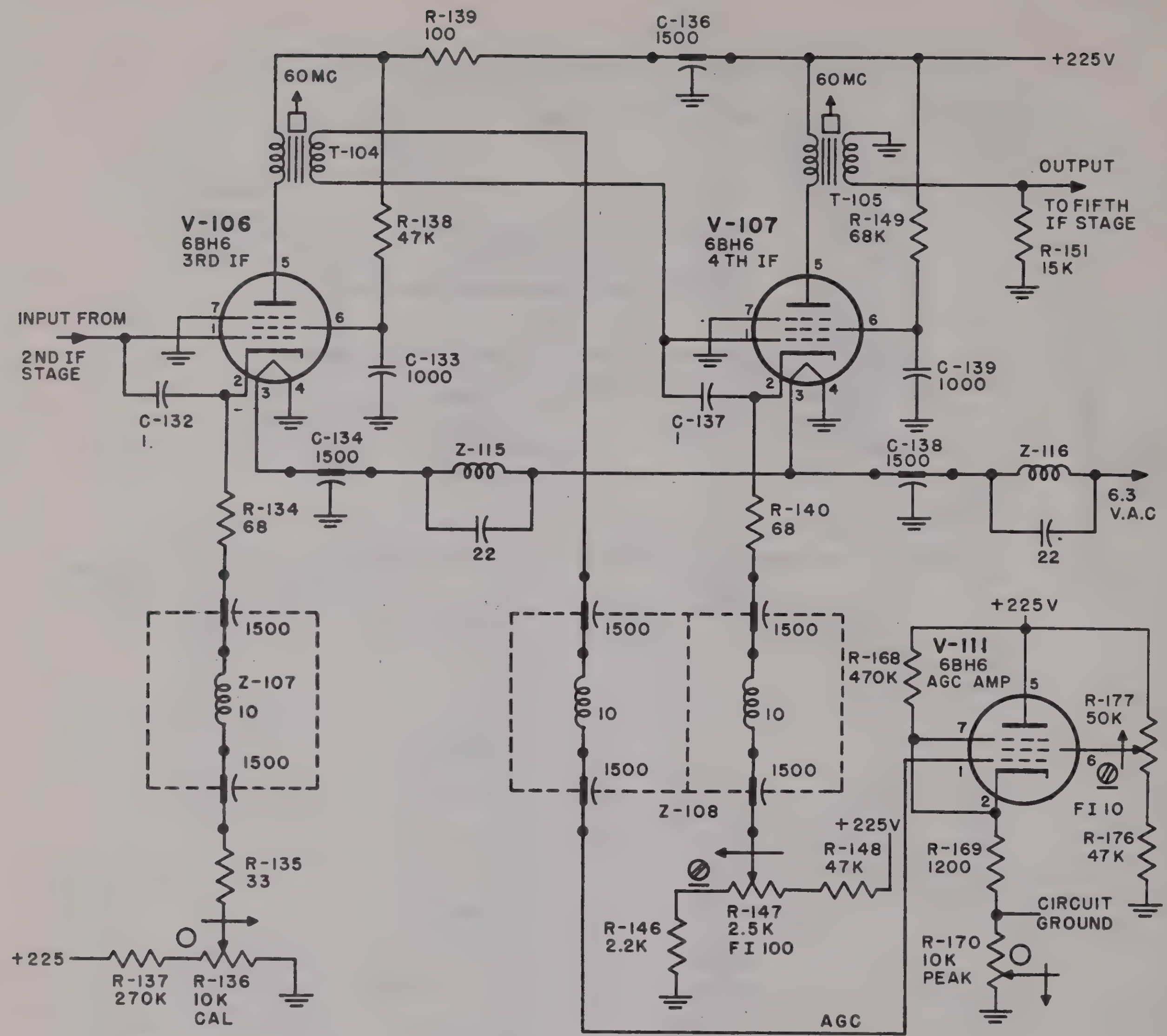



***Figure 2-8. Radio Interference-Field Intensity Meter IM-52A/URM-17, Schematic Diagram of the Third and Fourth IF Amplifier Stages***

one-half scale appears at the grids of V-111 and V-107. Since the circuit ground lead is connected to the high side of R-170 in the cathode circuit of V-111, this move toward cut off of V-111 decreases the voltage drop across R-170. Since the AGC voltage is negative, the decrease in voltage across R-170, in effect, adds to the AGC voltage with respect to the fixed bias on V-107. This composite voltage overcomes the fixed bias on V-107 and reduces the gain of the tube.

*g.* FIFTH AND SIXTH IF AMPLIFIER STAGES. *(See figure 2-9.)*—The fifth IF stage is a fixed gain stage, with bias varied in certain function switch positions to equalize the gain for all functions. Miller Effect compensation is accomplished by R-152, where the change in gain of the fifth IF is not as great as in previous stages. The cathode potential of V-108 is adjusted by R-178 to obtain meter scale tracking at the top of the scale in the QP function. For the same reason, the fixed resistor R-189 is connected in series with R-187 in the PEAK position of the function switch.

The sixth IF stage is a power driver stage using a power amplifier pentode 6AR5 in a fixed high-gain circuit with a high dynamic range (overload capacity). Cathode bias is used. Screen grid neutralization is obtained by a voltage tapped off the voltage divider T-107 and C-154 and coupled to the screen grid. The sixth IF stage output is developed across the transformer T-107, which presents a low impedance source to the detector to obtain short detector charging time. R-162 in shunt across the primary of T-107 broadens the bandwidth of the stage.

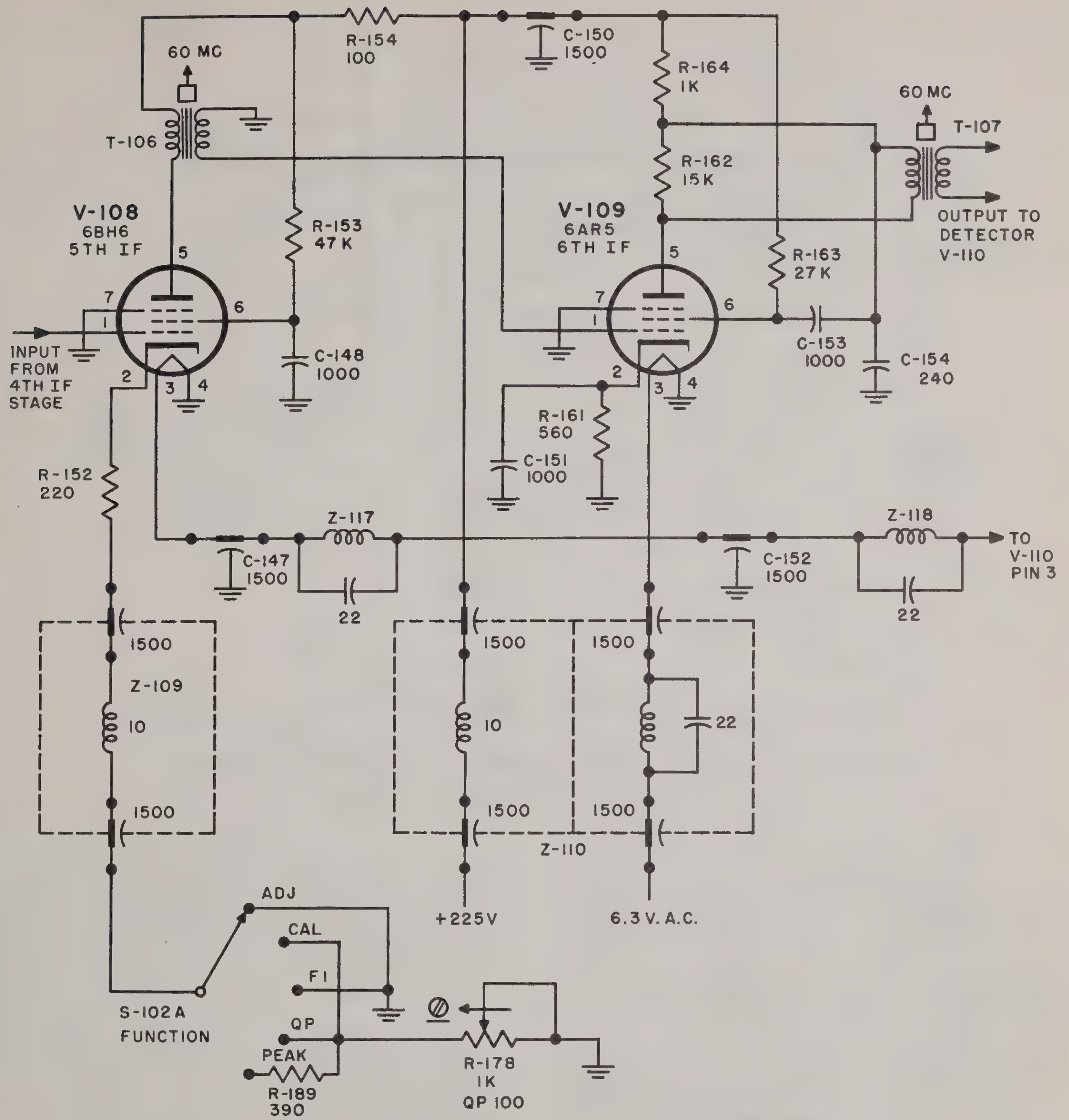



**Figure 2-9. Radio Interference-Field Intensity Meter IM-52A/URM-17. Schematic Diagram of the Fifth and Sixth IF Amplifier Stages**

*b.* DETECTOR STAGE. *(See figure 2-10.)* — The 5726/6AL5 diode detector V-110 demodulates the IF signal in a linear duo-diode detector circuit. One diode output branches into two circuits—to the first audio stage V-114, and to the AGC and VTVM circuits in FI and PEAK functions. The other diode furnishes an output to the AGC and VTVM circuits in the QP function only. That portion of the demodulated signal passing to the VTVM circuits will be known as the "DC" voltage, that portion passing to the audio circuits will be known as the audio signal. It should be noted, however, that both portions of the diode output will originally contain both audio and "DC" components (corresponding to carrier intensity) if both were present in the received signal. The naming of "DC" voltage and audio signal is only for convenient reference purposes.

One important distinction constitutes a major dif-

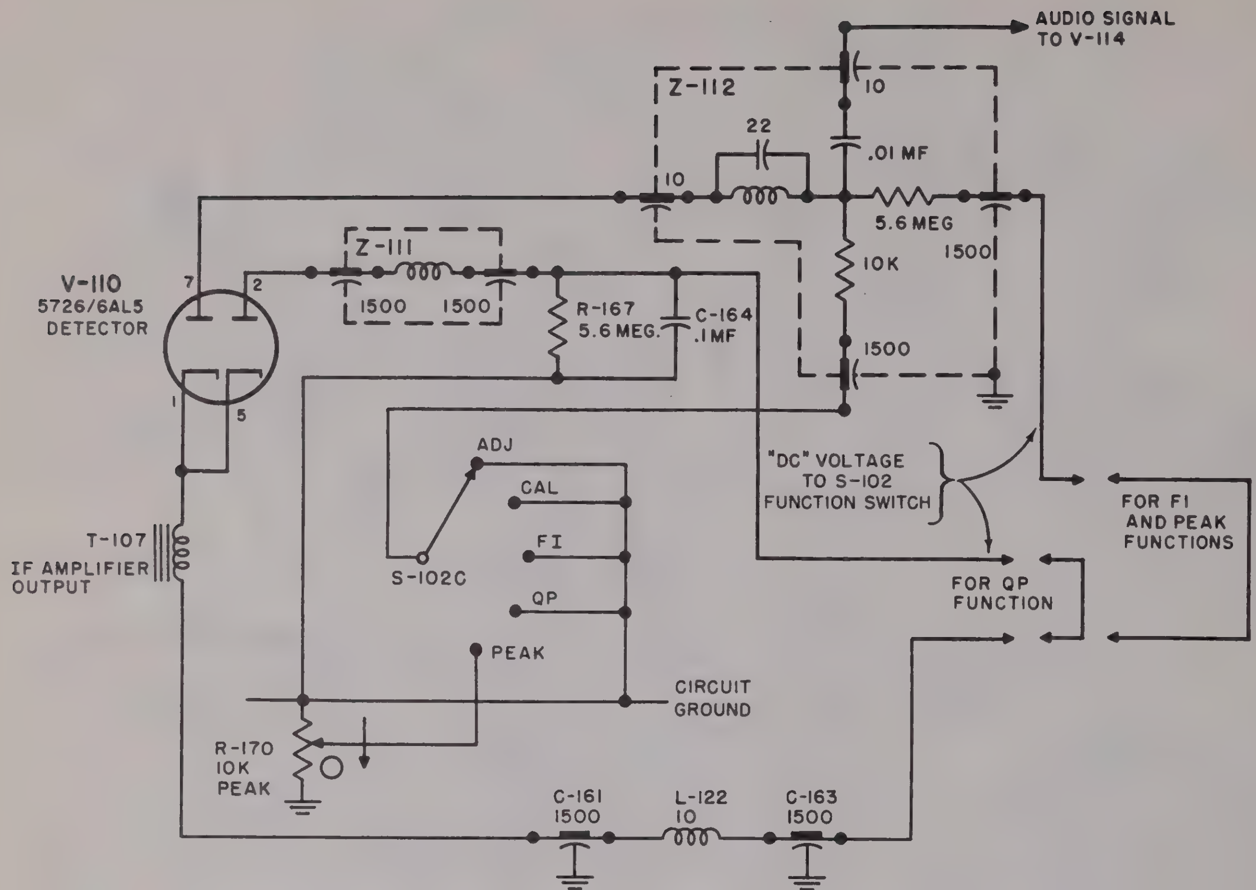



**Figure 2-10. Radio Interference-Field Intensity Meter IM-52A/URM-17, Schematic Diagram of the Detector Stage**

ference in the audio and "DC" output of the detector. The audio signal drops its DC component (corresponding to carrier intensity) at the coupling capacitor in Z-112, while the "DC" voltage retains its DC and AF components.

*i.* AUDIO AMPLIFIER STAGES. *(See figure 2-11.)*—The first audio amplifier V-114 is similar to a video amplifier with flat response to approximately one-half megacycle, partially due to the peaking circuit formed by R-207 and L-123. An oscilloscope receptacle could readily be connected in its plate circuit, due to the broad bandwidth and flat response characteristics of this stage.

Considering this section as a straight audio amplifier, the output of V-114 is capacitively coupled to V-115B through the OFF position of TUNING AID-PULSE STRETCHER switch S-103. Audio output tube V-115B is connected as a voltage amplifier using automatic self bias. Audio amplifier output is taken from T-108 to the panel mounted headphone jacks J-102 and J-103. The output level is adjusted by means of R-213 in the input circuit to V-115B.

In some instances the received signal is a series of pulses so short and with repetition rate so low that the power output of the audio amplifier is not sufficient to operate the headphones. The PULSE STRETCHER position of S-103 is used to overcome this difficulty. A triode amplifier V-115A and diode V-116 are inserted between the first audio and audio output stages. The capacitor-resistor decay network in the diode load circuit widens the pulse signal for application to the audio power stage.

The pulse stretcher circuit is also operative in the TUNING AID position of S-103. However, the TUNING AID position of the switch also connects the 2-volt output from the dry-rectifier CR-101 to the coil of the vibrator E-101. This is a source of RF interference for injection at the RF input to the receiver as an aid in tuning the RF section.

*j.* THE VACUUM-TUBE VOLTMETER STAGE. *(See figure 2-12.)*—The triode 6135/6C4 tubes employed in the VTVM stage are connected in a circuit that is an adaptation of the familiar balanced VTVM circuit. The "DC" voltage to be measured is applied to the grid of V-112 and upsets the balance of the stage, causing the indicating meter M-101 to deflect upscale and indicate the magnitude of the unbalance.

The use of this balanced VTVM circuit counteracts the effects of supply voltage variation, since supply variations will affect both tubes equally and the re-

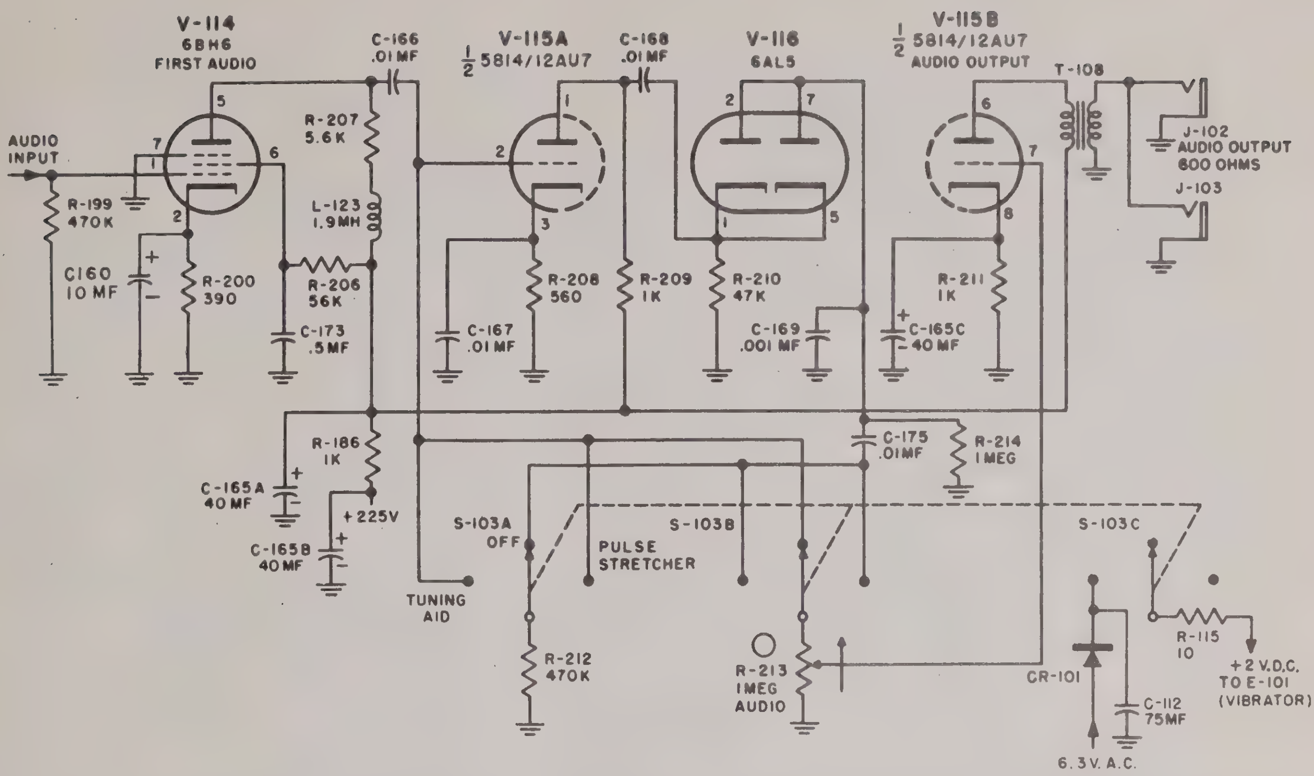



**Figure 2-11. Radio Interference-Field Intensity Meter IM-52A/URM-17, Schematic Diagram of the Audio Amplifier Stages**

sulting change in meter indication due to supply voltage variation will be negligible.

The ADJ ZERO control R-196 adjusts the voltage applied to the plates of V-112 and V-113 for balancing. Balance is indicated by a zero reading of M-101 when no signal input is present. The control R-198 in series with M-101 is a voltmeter sensitivity control for adjusting the meter scale tracking at one-half scale in the QP and PEAK functions.

RF pickup by the cables connected to the closed circuit REMOTE METER J-101 is filtered by C-170 and C-171.

## 3. THE WEIGHTING CIRCUITS.

**Note**

The term "weighting" as applied to the equipment specifically refers to the time constant introduced in the detector and AGC circuit. This "weighting" effectively determines the time vs. voltage characteristics of the indication obtained.

The weighting circuits are selected by the function switch S-102 and serve to properly weight the signal supplied to the indicating meter for the three types of measurements performed by the equipment.

Simplified schematics from which all switching details have been deleted are used to illustrate these circuits.

*a.* THE FIELD INTENSITY CIRCUIT. *(See figure 2-13.)*—The AGC and VTVM circuits see a voltage source which charges slowly and discharges slowly so that the meter indication shows an average of the input signal over 600 milliseconds continuously. The 10,000-ohm resistor in Z-112 is the diode load resistor and a charge-discharge action is accomplished through the 5.6-megohm resistor in Z-112 and by C-172 in shunt with it and the load resistor.

The meter reading for field intensity is proportional to the field intensity of radiated signals, or proportional to the averaged value of RF interference. The reading will be independent of modulation in the case of modulated CW signals because the time constant formed by the 10-micro-microfarad capacitor and 10,000-ohm resistor in Z-112 is short enough to follow any modulation present at the detector input.

A voltage picked off R-181 applies a bias to V-110 which counteracts the contact potential of the diode.

The network comprising C-161, C-163, and L-122 is an IF filter to reject the 60-megacycle IF voltage.

*b.* THE QUASI-PEAK CIRCUIT. *(See figure 2-14.)* —In the quasi-peak function the time constants of the detector weighting circuits are approximately one mil-

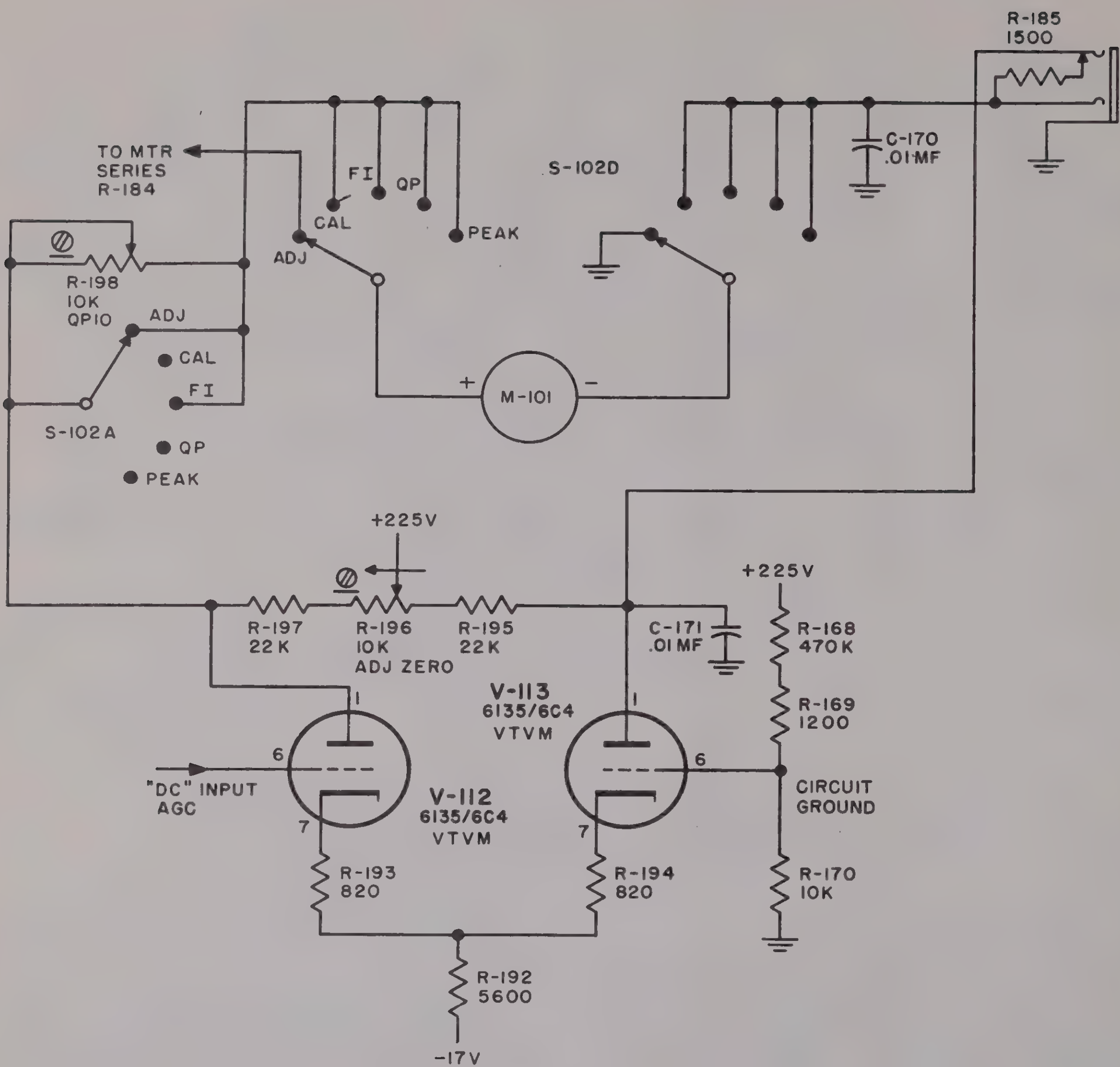



**Figure 2-12. Radio Interference-Field Intensity Meter IM-52A/URM-17, Schematic Diagram of the Vacuum-Tube Voltmeter Stage**

lisecond charge and 600 milliseconds discharge. For pulse signals several microseconds or more in width and with a pulse repetition frequency (PRF) of 1000 per second or greater, the meter indication is near the peak value of an interfering signal as seen at the ouput of the second detector. For pulses sharp with respect to the reciprocal of the bandwidth (one microsecond) measurements can be made of a signal with a PRF (pulse repetition frequency) as low as 120 cycles per second. At this PRF the ratio of PEAK to QP readings is approximately 10 to 1 and so a full scale QP reading represents a pulse amplitude at the output of the second detector which is at the dynamic range limit (20 db) of the equipment. The diode load resistor is R-167 and the weighting circuit charge-discharge action is accomplished by C-164 across the diode load. IF filter Z-111 rejects the 60-megacycle IF voltage.

QP 1 control R-179 accomplishes the same results as R-181 described under paragraph 3*a*. A separate potentiometer is employed because the actual bucking potential is different than that required in the field intensity position of the function switch due to the different diode loads. Quasi-peak meter indications are adjusted to be the same as those in the field intensity function, using the same unmodulated signal, by adjustment of the QP 100 control R-178, shown in figure 2-9.

*c.* THE PEAK CIRCUIT. *(See figure 2-15.)*—In the peak function, the circuit is similar in some respects to the field intensity circuit described in paragraph 3*a*. The VTVM and AGC circuits are the same, but an

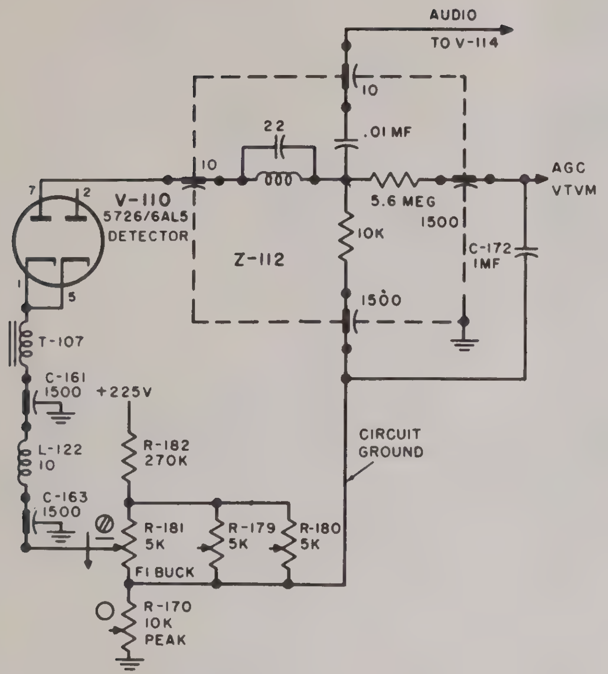



**Figure 2-13. Radio Interference-Field Intensity Meter IM-52A/URM-17, Field Intensity Weighting Circuit**

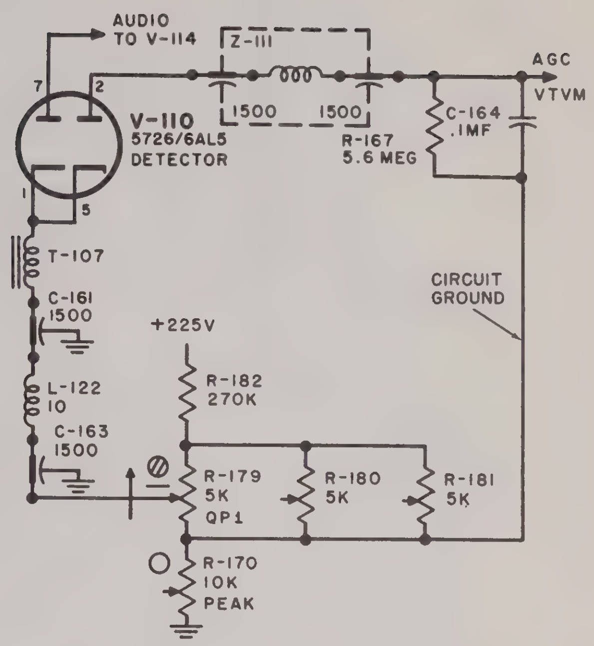



**Figure 2-14. Radio Interference-Field Intensity Meter IM-52A/URM-17, Quasi-Peak Weighting Circuit**

additional bias circuit R-170 has been added to enable the measurement of peak signal values. The peak value measured is the "peak" as seen by the second detector and not the true peak of the signal at the antenna input. The PEAK function of the function switch acts to apply a DC voltage in parallel with the signal input. The circuit is similar to an adjustable delayed AGC system, since the DC voltage is also applied to the detector V-110. The DC voltage is manually adjusted to the threshold of diode rectification. This measurement technique is similar to that employed in the "slide-back" voltmeter. For any given measurement at the low end of the meter scale, the PEAK BUCK control R-180 equalizes the meter reading obtained in the peak position of the function switch with that obtained in the field intensity position.

## 4. CIRCUIT ANALYSIS, POWER SUPPLY PP-530A/URM-17.

*(See figure 2-16.)*

The power supply is designed for operation from any AC power source within the limits of 105-125 and 210-250 volts, and at any frequency between 50 and 1600 cycles per second.

An RF isolation filter Z-301 filters the power input to the power supply. Toggle switch S-302 on the power

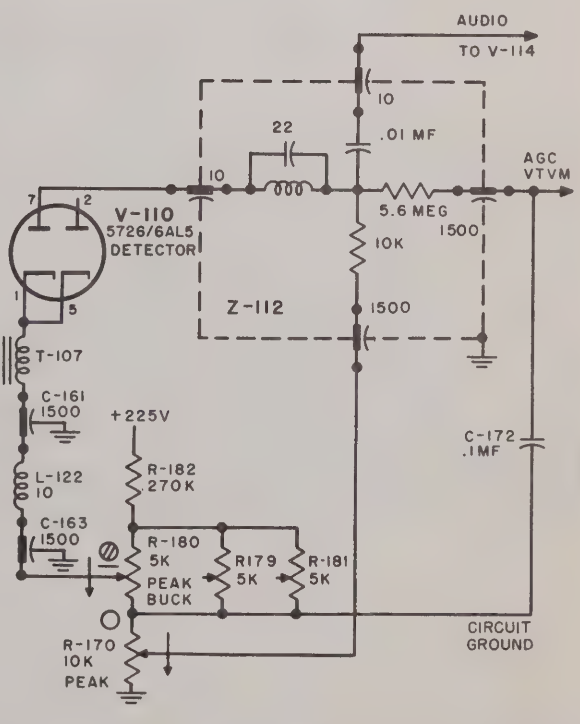



**Figure 2-15. Radio Interference-Field Intensity Meter IM-52A/URM-17, Peak Weighting Circuit**

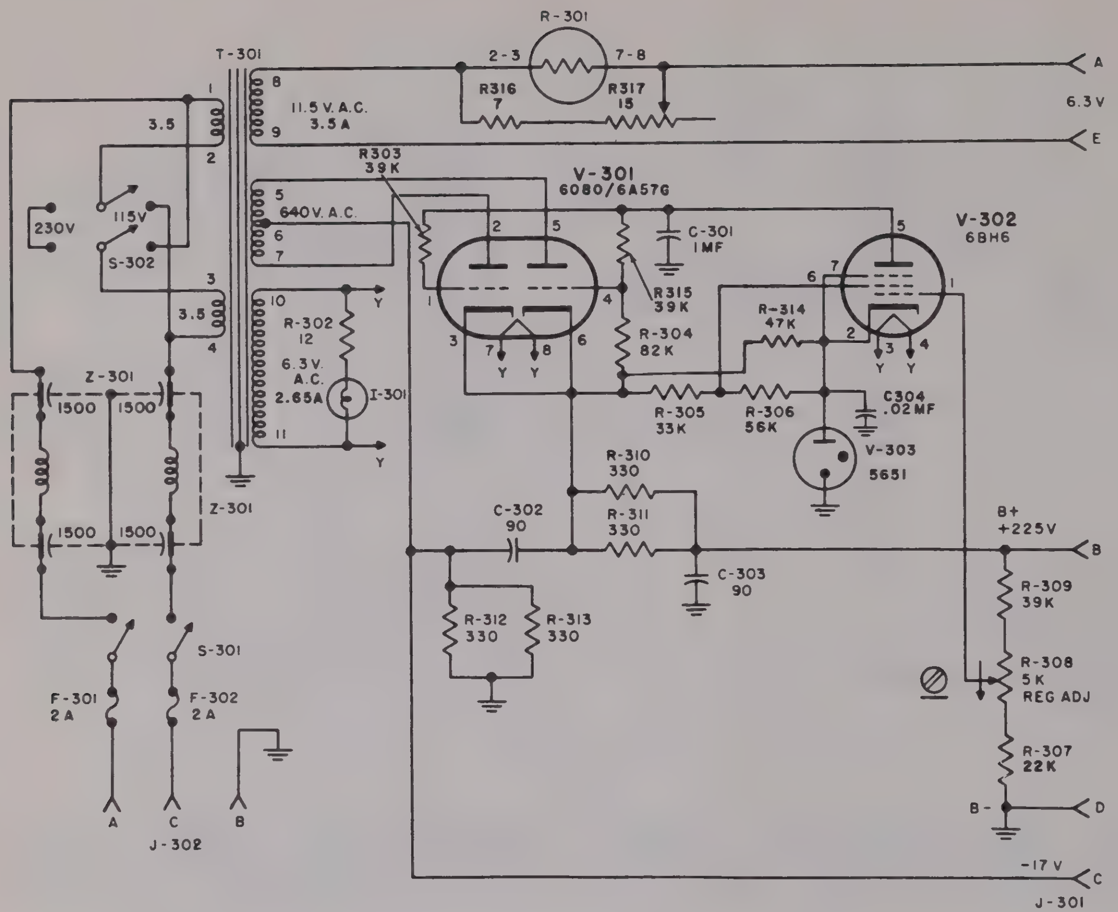



*Figure 2-16. Power Supply PP-530A/URM-17, Schematic Diagram*

supply chassis connects the two primaries of the power transformer T-301 in parallel for operation from a 105-125 volt source, and in series for operation from a 210-250 volt source. An input-voltage designating tag on the power supply front panel must be manually positioned to indicate the setting of S-302.

Regulated 225 volts DC for the plate supply is derived from the twin triode V-301 used as a combination full-wave rectifier and series regulator. V-303 is a gaseous voltage regulator type 5651 used as the voltage reference source and the pentode V-302 is used as the control tube. The desired value of B+ output is determined by the setting of REG ADJ R-308, which sets the grid bias for the control tube V-302. The rectifier filter circuit uses high-capacity electrolytic capacitors in a resistance-capacity filter.

Part of the filter resistance, R-312 and R-313, is in the common negative lead through which the relatively constant plate supply current passes. The voltage drop across R-312 and R-313 constitutes the bias supply of —17 volts.

The heater supply voltage at 6.3 volts AC is obtained from a separate winding on the power transformer and is regulated by the thermal voltage regulator R-301. Thermal voltage regulator R-301 is shunted by R-316, a 7.0 ohm fixed wire-wound resistor and R-317, a 15 ohm wire-wound potentiometer, which permits setting the heater voltage to exactly 6.3 volts AC and is an internal screwdriver adjustment.

# SECTION 3

# INSTALLATION

## 1. SCOPE OF THIS SECTION.

Radio Test Set AN/URM-17A is portable equipment and no provisions are made for permanent mounting. Procedures for setting up the equipment for operation are given in this section; actual operating procedures are given in the succeeding Section 4.

## 2. UNPACKING THE EQUIPMENT.

*(See figure 3-1.)*

Unpack the equipment as directed in figure 3-1. Do not tear the waterproof barriers; open them carefully so that they can be used again. For the same reason, use a nail-puller or other suitable tool for removing

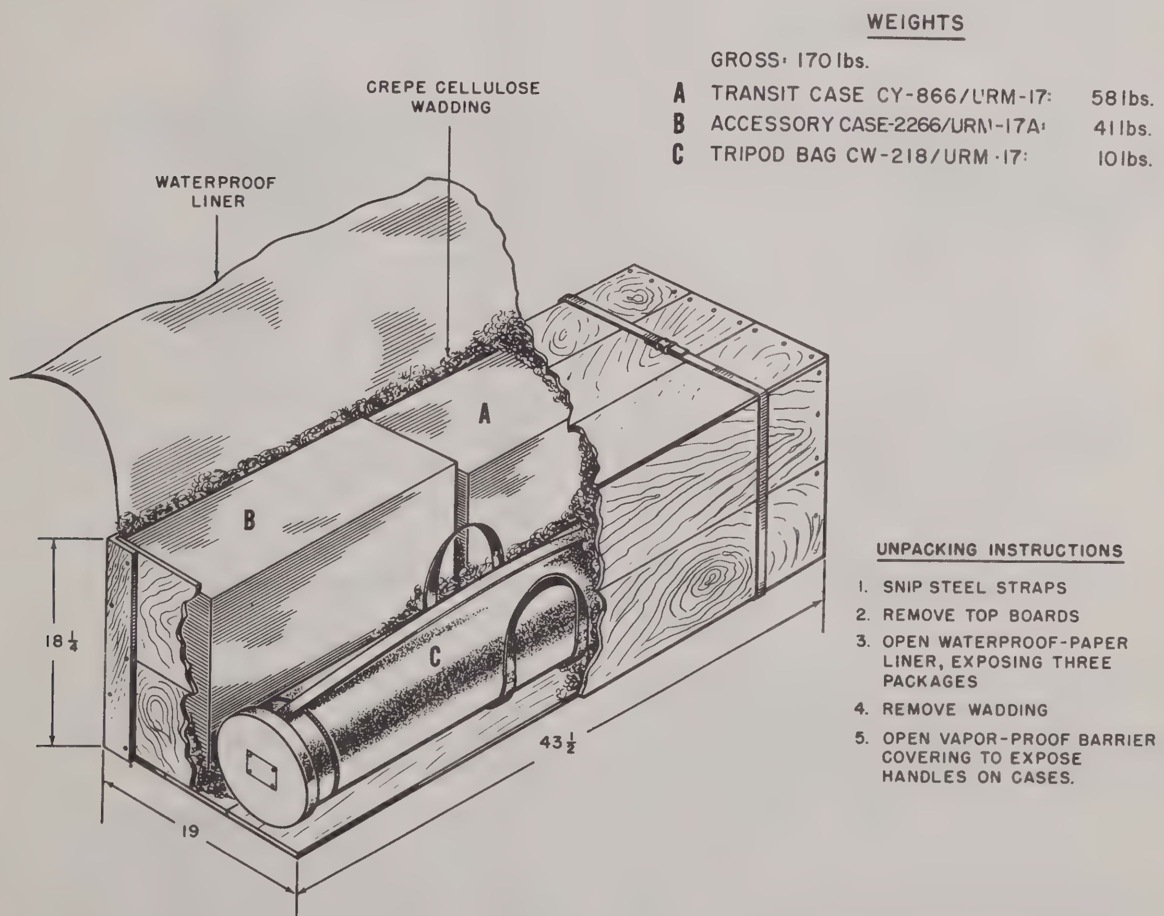



***Figure 3-1. Radio Test Set AN/URM-17A, Unpacking Procedure***

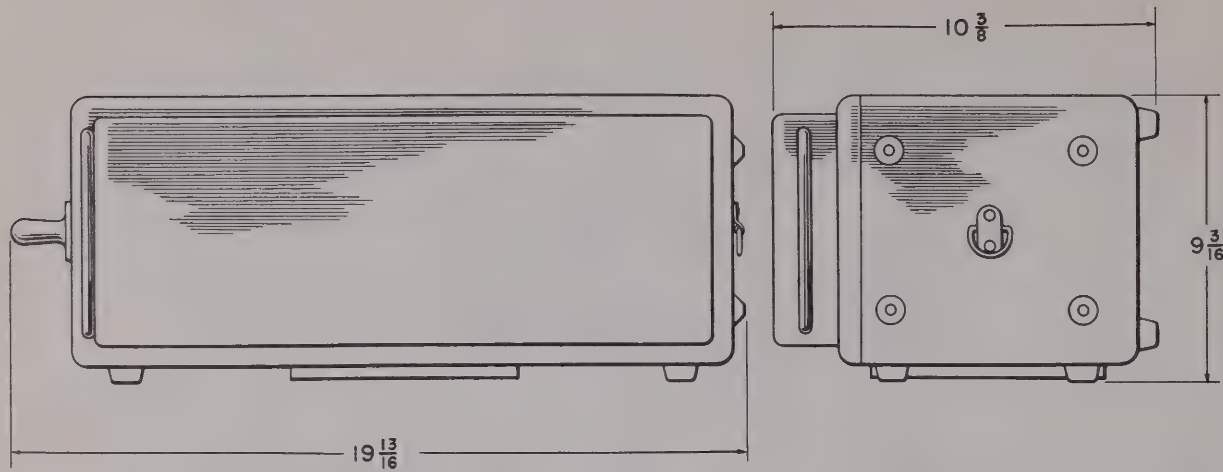



Figure 3-2. Radio Interference-Field Intensity Meter IM-52A/URM-17, Outline Drawing

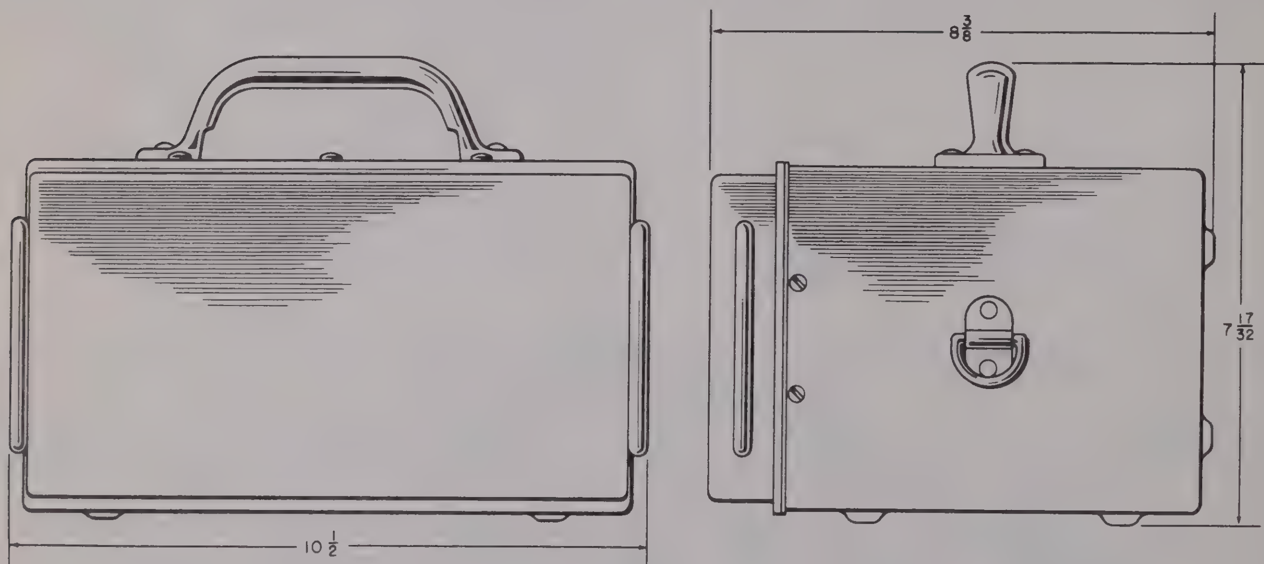



Figure 3-3. Power Supply PP-530A/URM-17, Outline Drawing

nails in the shipping case cover so that the cover is not broken up. Upon removing the equipment from the shipping case it is advisable to put the cellulose wadding and waterproof barriers back in the shipping case and to retain the case for use in re-shipping the equipment.

### 3. DIMENSIONAL DATA.

*(See figures 3-2, 3-3, 3-4, 3-5.)*

Dimensional data given in the referenced figures can be used for estimating the space requirements in the variety of operating locations afforded by Radio Test Set AN/URM-17A. These include operation on various classes of vessels, at shore stations, in the field, in aircraft, and in military vehicles. These data are also useful in planning storage or transportation facilities for the equipment.

### 4. POWER SUPPLY REQUIREMENTS.

In general, Radio Test Set AN/URM-17A will be operated with an external power source supplying power to Power Supply PP-530A/URM-17. The external source must be rated at 105-125 or 210-250 volts A.C., single phase with frequency between the range of 50 and 1600 cycles. Power consumption is 115 watts at 115 volts, 60 cycles.

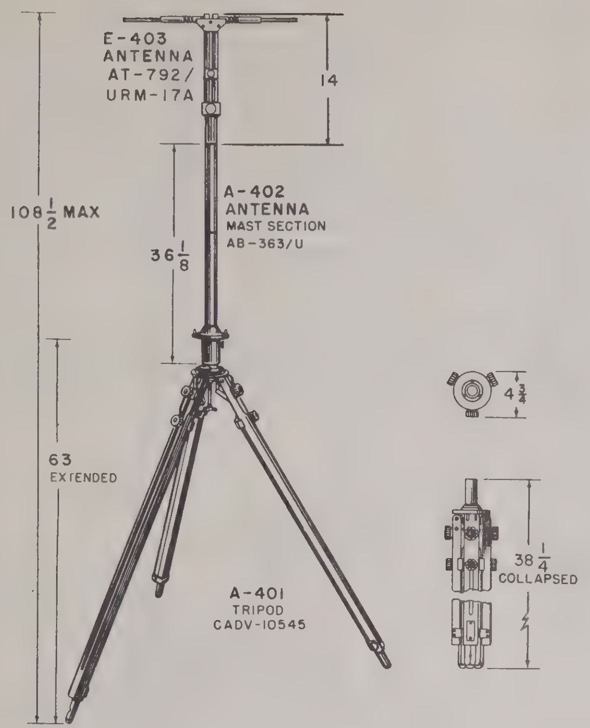



***Figure 3-4. Antenna AT-792/URM-17A and Tripod CADV-10545, Outline Drawing***

If no AC power source is available, the equipment can be operated from a suitable battery pack. The Special Purpose Cable Assembly CADV-62482 (2′ 0″) as supplied with the Radio Test Set AN/URM-6 is suitable for making connection from the battery pack to the power supply unit. The required plate potential is 225 volts at approximately 107 milliamperes, obtainable from five series-connected 45-volt dry batteries. Use Battery JAN BA-26, Navy Type 19004A, commercial type Burgess #21308 or equivalent. A bias potential of approximately −22.5 volts at approximately 6.9 milliamperes is suitable and can be obtained from one section of a 45-volt battery or one 22.5-volt Battery JAN BA-2, Navy Type 19033. Filament voltage of 6.3 volts at 3.63 amperes can be obtained from a storage battery, Navy Type 6V-SBMD-175AH, Federal Standard Stock Catalog No. 17-B-9536.

## 5. INITIAL EQUIPMENT SET-UP.

*(See figure 3-6.)*

*a.* GENERAL.—As previously stated, Radio Test Set AN/URM-17A is radio interference and field intensity survey equipment suitable for operation on various classes of vessels, at shore stations, in the field, in aircraft, and in military vehicles. Instructions for setting up the equipment are given in paragraph 5*b* and the optional use of accessories from other related test sets is given in paragraph 5*c*.

*b.* REGULAR SET-UP.

Step 1. Open the transit case and lift the RI-FI Meter out of the case. Place the unit on a convenient bench or other flat surface with the front panel in a vertical plane. Remove the protective cover for access to the front panel. Remove the Chart Set PT-430/URM-17A from the protective cover for reference during operation.

Step 2. Lift Power Supply PP-530A/URM-17 out of the accessory case and place on the bench or on the ground. Remove the protective cover from the unit.

**CAUTION**

Operate the power supply with front panel facing up because a thermal voltage regulator in the power supply unit must be in a vertical position during operation.

Step 3. Open the strap fasteners securing the cables in the accessory case.

Step 4. Remove the Special Purpose Cable Assembly 91487-1 (10′ 0″) and connect between the POWER OUTPUT receptacle on Power Supply PP-530/URM-17 and the POWER receptacle on the RI-FI Meter.

Step 5. Remove the short power cable CX-3810/U (6′ 6″) and connect to the POWER INPUT receptacle on Power Supply PP-530A/URM-17.

Step 6. Remove the R-F Cable Assembly CG-92D/U (20′ 0″) and connect one end to the R-F INPUT receptacle on the RI-FI Meter.

**Note**

In all classes of measurements, the RF Cable Assembly CG-92D/U (20′ 0″) must be connected between the RF INPUT receptacle and the antenna or probe.

Step 7. Connect either end of R-F Probe DT-194/URM-17A to the R-F cable and the other end to the external circuit for measurements made on 50-ohm impedance circuits.

Step 8. Construct a plug (UG-21/U Series) and jumpers for connection between R-F Probe DT-194/URM-17A and load to make conducted interference measurements on power lines up to 1000 volts AC or DC. The measurement in this case is made from each side of the line to ground and not across the line.

Step 9. Assemble the antenna mast and tripod for measurements using the dipole antenna. Open the zipper closures on the tripod bag and remove the tripod. Loosen the upper knob on each leg, spread the legs as needed for adequate stability, and tighten the lock knobs. The extension portion of the tripod legs are removable, with one end fitted with a rubber foot for use on hard surfaces and the other end with a

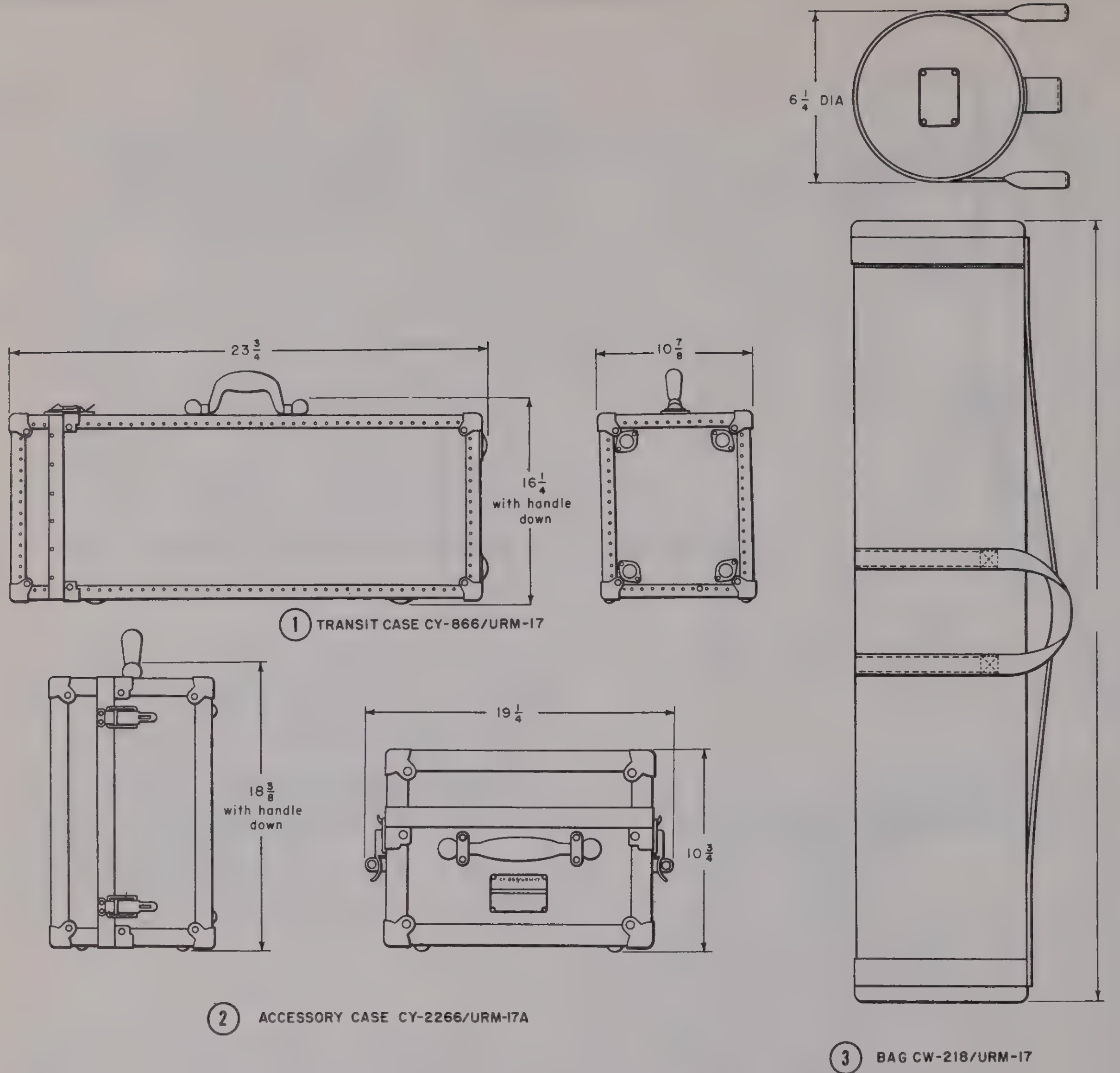



**Figure 3-5. Carrying Cases, Outline Drawing**

steel spike for use on soft surfaces. After loosening the lower lock knob on each leg, the extension portion can be lengthened or reversed as desired.

Step 10. The azimuth bearing dial assembly is inverted on the tripod head for stowing in the tripod bag, so that the sighting pins on the dial will be protected. Loosen the lock screw on the azimuth dial and slide it off the sleeve on the tripod head. Then, with the azimuth dial facing up, slip the assembly in place on the tripod head. The azimuth dial must be oriented to magnetic north before being locked to the tripod head.

Step 11. Remove the Antenna Mast Section AB-363/U from the pocket in the tripod bag.

Step 12. Take the dipole antenna and dipole elements from the accessory case.

| ACCESSORY | PARENT TEST SET |
|---|---|
| Observer Compass MARK 1 MOD O | AN/URM-6 |
| Headphones CW-49509 | AN/URM-6 |
| Special Purpose Cable Assembly CG-572/U (20′ 0″) | AN/URM-6<br>AN/PRM-1 |
| Special Purpose Cable Assembly CG-571/U (20′ 0″) | AN/URM-6<br>AN/PRM-1 |
| *Milliammeter-Recorder RD-59/U | AN/URM-6 |
| Special Purpose Cable Assembly CG-571/U (6′ 0″) | AN/URM-6 |
| Tripod MT-674/U | AN/URM-6 |
| Special Purpose Cable Assembly CADV-62482 (2′ 0″) | AN/URM-6 |

*Calibrated rule supplied with this unit not suitable for use with Radio Test Set AN/URM-17A.

Use the six-inch elements for the frequencies between 375-460 megacycles, the four-inch elements for 450-650 megacycles, and the two-inch elements for 650-1000 megacycles. The two arms of the antenna are fitted with chucks to mount the selected dipole elements. Connect the RF cable to the base of the antenna and mount the antenna at the top of the antenna mast section, or directly on the tripod if desired. Place the mast section temporarily into the azimuth dial assembly until the azimuth dial has been oriented with magnetic north.

*c.* OPTIONAL SET-UP. — Certain accessories supplied with related equipment can be used with Radio Test Set AN/URM-17A to facilitate field operations as follows:

| OPTIONAL USE |
|---|
| Orient dipole antenna to magnetic north. |
| Aural monitoring. |
| Headphone extension cable. |
| Remote meter indication at location of dipole antenna. |
| Cable to remote meter. |
| Making graphic recordings. |
| Cable to milliammeter-recorder. |
| To mount the RI-FI Meter on a tripod. |
| Connection to batteries when separate battery pack power supply is used. |

The use of these units will be briefly described here: A mounting plate is fitted to the bottom of Radio Interference-Field Intensity Meter IM-52A/URM-17 similar to that on the bottom of Radio Interference-Field Intensity Meter IM-36/URM-6 so that the RI-FI Meter can be mounted on the Tripod MT-674/U if desired.

Topography of the survey site might require the dipole antenna location be approximately twenty feet from the location of the RI-FI Meter. In this case, it would be convenient to use the remote Ammeter ME-131/U at the antenna, when turning the antenna to obtain a null indication and magnetic bearing. Connect the remote meter to the REMOTE METER receptacle on the RI-FI Meter, using the remote meter cable CG-571/U (20′0″). Headphone extension cable CG-572/U (20′0″) permits use of headphones at the antenna location.

It might also be convenient to use Milliammeter-Recorder RD-59/U to make graphic recordings. In this case, a source of 115 volts, 60-cycle A.C. must be available for the synchronous motor in the recorder. The recordings will be approximations only, in view of the fact that the chart ruler supplied with the recorder is not calibrated for use with Radio Test Set AN/URM-17A. However, a new chart ruler can be calibrated by using the RI-FI Meter scale as reference. Connect the recorder to the REMOTE METER receptacle on the RI-FI Meter by means of cable CG-571/U (6′0″). Using the PEAK function of the RI-FI Meter, adjust the PEAK control to obtain indicating meter readings at the main calibration points on the meter scale. Place a strip of clear plastic across the recorder chart and score the plastic at the points obtained from the chart record.

When it is desired to use an external battery pack, use Special Purpose Cable Assembly CADV-62482 (2′0″) between the batteries and the power cable 91487-1 (10′0″). Battery requirements are stated in paragraph 4 of this section.

In the event of power cable failure in the field, note that the power cables for connection between the RI-FI Meter units and power supply units are identical in Radio Test Sets AN/URM-6, AN/PRM-1, AN/URM 17 and AN/URM-17A. The power cables for connection between the power supply unit and power source are also identical.

The tripod, azimuth dial assembly, and azimuth dial pointer are identical to the units supplied with Noise-Field Intensity Meter TS-587/U.

*d.* CONNECTING TO EXTERNAL POWER SOURCE.—The external power source may be either 105-125 or 210-250 volts AC, 50-1600 cycles per second. Connect the plug on the end of the power cable CX-3810/U (6′6″) to the external source.

To accommodate either voltage source, the power switch S-302 on the chassis of Power Supply PP-530A/URM-17 must be set to an appropriate high or low voltage position. The "in-use" position of this switch is indicated by means of a metal reminder tag to the right of POWER INPUT J-302. This tag covers one half of the panel legend reading "115V 230V". Check that the exposed portion of the legend agrees with the power source voltage to be used. If the 115V position of S-302 is indicated and a 230-volt source is contemplated, stand the power supply on the front-panel guards. Remove ten screws at the sides of the power supply case. Slide the case off the chassis. Set toggle switch S-302 on the chassis to the 230-volt position. Slide the case over the chassis and *start* the ten screws in the sides of the case. Invert the power supply so that the panel is up. Tighten the ten screws. Loosen the screw that fastens the reminder tag on the front panel. Rotate the tag 180 degrees to cover the 115V portion of the legend. Tighten the screw.

Connect a good ground to the GROUND binding post on the front panel of Power Supply PP-530A/URM-17 or to the third conductor of Power Cable

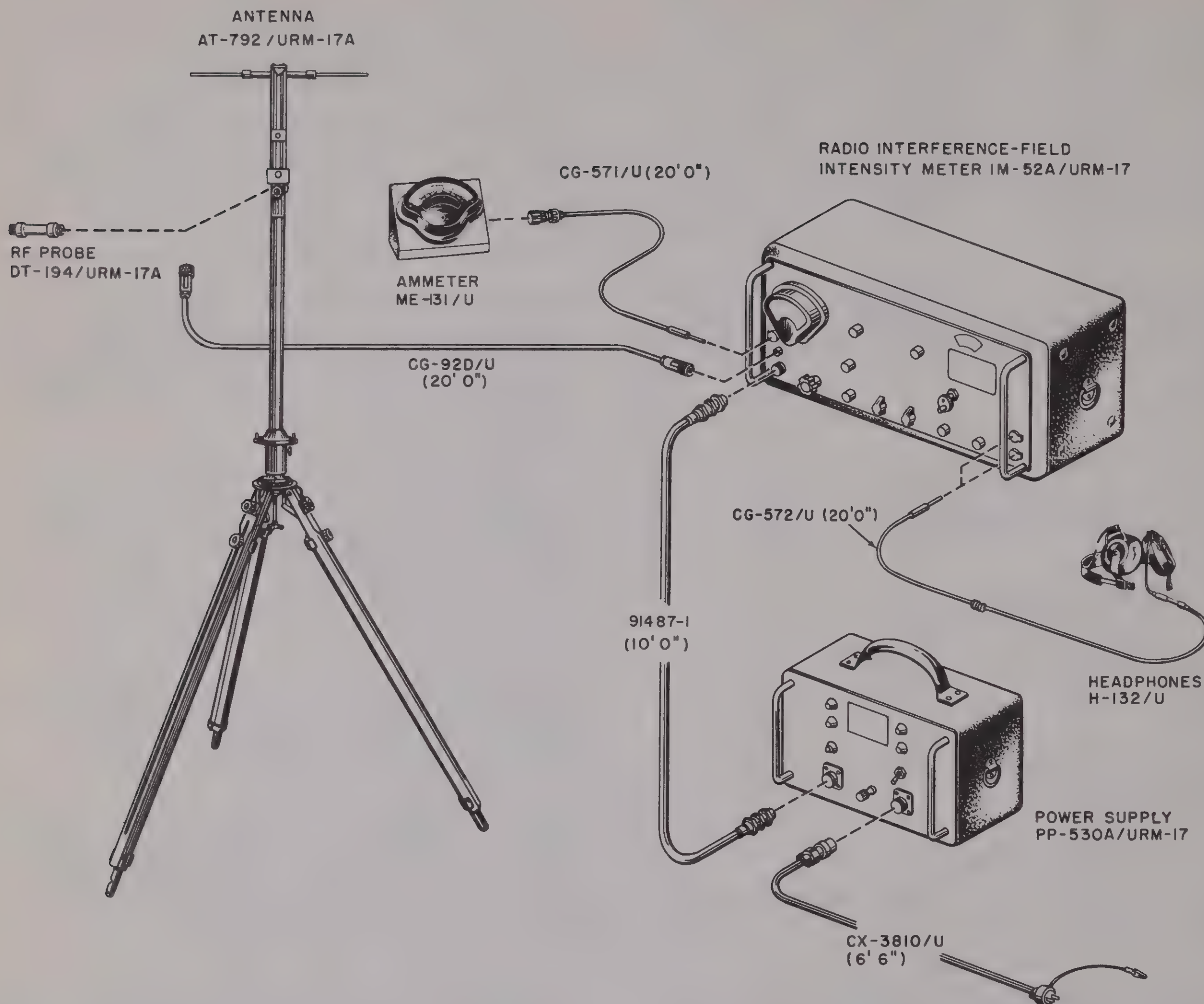



***Figure 3-6. Radio Test Set AN/URM-17A. Cabling Diagram***

Assembly CX-3810/U (6′ 6″). Only one ground point should be used because grounding more than one creates a loop in conjunction with the interconnecting cable. To avoid making a loop, make sure the case of any ungrounded unit is not inadvertently grounded by placing it on the earth or on a steel deck.

## 6. INITIAL ADJUSTMENTS.

*a.* ELECTRICAL ADJUSTMENTS. — All internal alignment and calibration adjustments on Radio Test Set AN/URM-17A are made at the factory and no further adjustment is required in the field prior to operation.

(1) OPERATIONAL CHECK.—It is recommended that the following operational checks be made when the equipment has been set up for operation:

Step 1. Check the mechanical zero of the front panel meter. If the pointer is off zero, correct as necessary by means of the screw on the face of the meter. This must be done with POWER OFF.

Step 2. Turn POWER switch S-301 to ON. The power supply pilot light I-301 and the dial light of the RI-FI Meter should light. The equipment is ready for operation after a few minutes warm-up.

Step 3. Adjust CAL control fully counterclockwise. Set function switch to FI position and attenuator knob to X$10^2$ position. The meter M-101 should show a slight deflection above zero; that is, approximately 1% (1/16 inch) of full scale. (If the meter shows an appreciable deflection in either direction, of more than the 1% indicated above, an internal adjustment may be required. See instructions in paragraph 6a(2). If no adjustment is required, continue the operational check).

Step 4. *PULL* the attenuator knob all the way out, *TURN* to CAL position, and *PUSH* all the way in.

Step 5. Set function switch to ADJ.

Step 6. Turn TUNING AID-PULSE STRETCHER switch to OFF.

Step 7. Adjust ADJ control for a meter reading of 10 microvolts.

Step 8. Set function switch to CAL. Tune to calibrating frequency, approximately 800 megacycles *(see first page of Chart PT-430/URM-17A);* adjust R-F TRIM and MIXER TRIM for maximum meter indication.

Step 9. Adjust CAL control for a meter reading of 100 microvolts. Check for indication at remote meter, if used.

Step 10. PULL, TURN, then PUSH the attenuator control to the X10 position.

Step 11. Set function switch to the FI position. Tune the receiver across the entire band to determine that the equipment is operative over the band. In absense of signal this operation can be done with the TUNING AID on and the function switch in QP position. Select an attenuator position and AUDIO control setting required to give a comfortable audio volume level in the headphones.

Step 12. Check the slide back feature of the equipment as follows: Turn the function switch to the PEAK position. From its fully counterclockwise position, turn the PEAK control slowly in a clockwise direction until the received headphone signal just becomes inaudible. Observe the pointer of the indicating meter as the point of inaudibility is approached. If the pointer goes off-scale, set the attenuator control to the next higher position, using the required PULL-TURN-PUSH sequence. Return the PEAK control to the fully counterclockwise position, then readjust until the headphone signal just becomes inaudible.

(2) METER ZERO ADJUSTMENT.—In the event operational step 3 in paragraph 6*a*(1) indicates adjustment of the electrical meter zero is required, the chassis must be removed from the case and an internal adjustment made. Remove four rubber feet on the back of the case. Slide the chassis out of the case and up-end on a table. Connect a temporary jumper across the two terminal board terminals marked METER, see figure 7-4. Adjust the screw driver control ADJ ZERO R-196, located on top of the chassis directly behind the indicating meter *(see figure 7-3),* for an exact zero indication on the meter. Tighten the lock nut on R-196 and remove the temporary jumper. Check that the meter then reads approximately 1% up-scale with function switch in the FI or QP positions and with CAL control fully counter-clockwise. If further adjustment is required, the FI and QP controls R-181 and R-179 are improperly adjusted. In this case see instructions in Section 7, paragraph 9.

*b.* ORIENTING THE DIPOLE ANTENNA. *(See figures 3-7, 3-8, 3-9.)*—Approximate magnetic bearings of a signal source may be obtained with Radio Test Set AN/URM-17A. The approximate bearing of the signal source is given by the azimuth circle on the tripod head on which the antenna and antenna mast are mounted. However, each time the tripod is moved from location to location, the azimuth dial must be oriented with respect to magnetic north. Observer-Compass MARK 1 MOD 0 (not furnished) may be used for this orientation procedure.

The observer-compass was designed for obtaining distant shore bearings from a ship. It consists of a liquid-filled compass bowl and card with a means of illuminating the card, and a prism for permitting the direct reading of the card while sighting upon an object. A two-cell flashlight of non-ferrous construction, without the usual head containing lens and reflector, is fitted into the bottom of the compass bowl. The light from the flashlight bulb passes through a red plate to the translucent compass card. A switch on the side of the flashlight turns the light on and off. The prism above the compass is hinged to provide an adjustment in the angle between the line of sight from the eye to the distant point being observed and the image of the compass card in the prism. An open sight is also provided on the prism mounting. The lubber line above the compass card functions as the other sight in alignment with the object on which bearings are being taken.

**CAUTION**

Iron objects should be removed from pockets and all metallic tools etc. should be removed from the vicinity before reading the magnetic compass. Magnetic compasses are particularly unreliable near power lines and near metallic structures.

To orient the azimuth dial, temporarily remove the dipole antenna and antenna mast. Turn the azimuth dial so that zero is at the north side as close as may be estimated. Hold the compass upright and level in the hands, or if possible, resting upon a support of suitable height. Take a position such that the open sight above the prism on the compass is on a level with the sighting pins of the azimuth dial. Adjust the prism up or down until the compass card can be seen clearly. Then vary the position of the observer until the compass reads exactly north (360 degrees), the open sight and the lubber line are exactly in line with the 360-degree mark, and the line of sight passes directly over both of the sighting pins of the azimuth dial. It will be necessary to turn the dial to adjust its position as successive sights are taken with the observer compass, until the desired alignment is attained. At this point, tighten the lock screw on the azimuth dial, being careful not to move the dial while doing so.

There is an efficient bubble trap around the periphery of the compass bowl. If a bubble appears during use of the compass, turn the compass upside down and

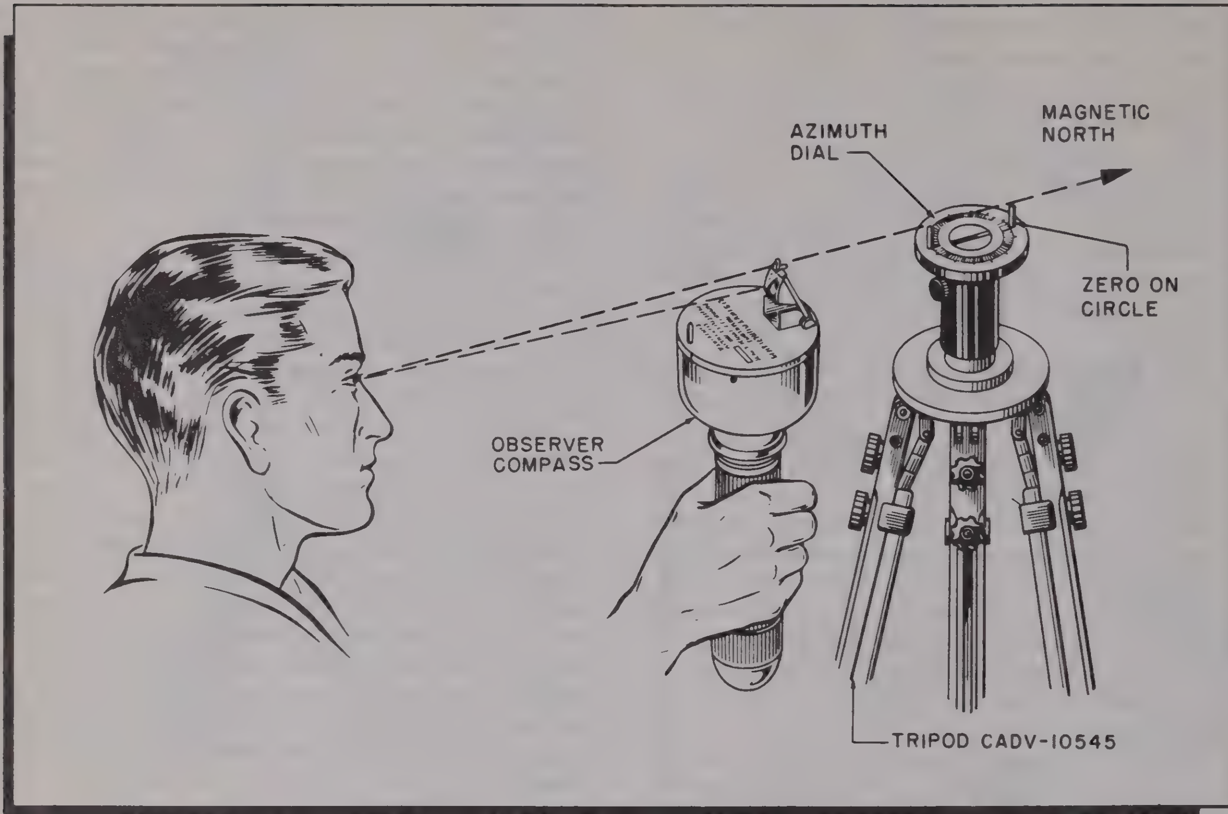



**Figure 3-7. Method of Indexing Azimuth Dial on Tripod**

slowly return it to the upright position. This puts the bubble behind the bubble trap where it will not be visible nor disturb the action of the compass card.

Place the mast section in the sleeve on the tripod head. *(See figure 3-8.)* Tighten the mast screw under the tripod head to secure the mast to the tripod. Check that the index line on the azimuth dial indicator on the base of the mast is directly in line with the vertical plane through the arms of the dipole as indicated in figure 3-9. Also check the clearance between the azimuth dial and dial pointer. If necessary, the azimuth pointer can be moved as follows: Loosen the two set screws on the pointer with an Allen wrench. With the pointer at the proper position to provide a clearance above the azimuth dial (1/32"), turn the pointer to bring the index line in line with the plane of the dipole *(see figure 3-9)*. Tighten the two set screws. Make certain that the spring steel collar inside the azimuth pointer is in place when the set screws are tightened.

## 7. TRANSPORTING THE EQUIPMENT.

*a.* PACKING IN CARRYING CASES.—Safe stowage for each unit and accessory of Radio Test Set AN/URM-17A is provided in the carrying cases supplied. These cases are adequate packing for transporting the equipment from one survey site to another.

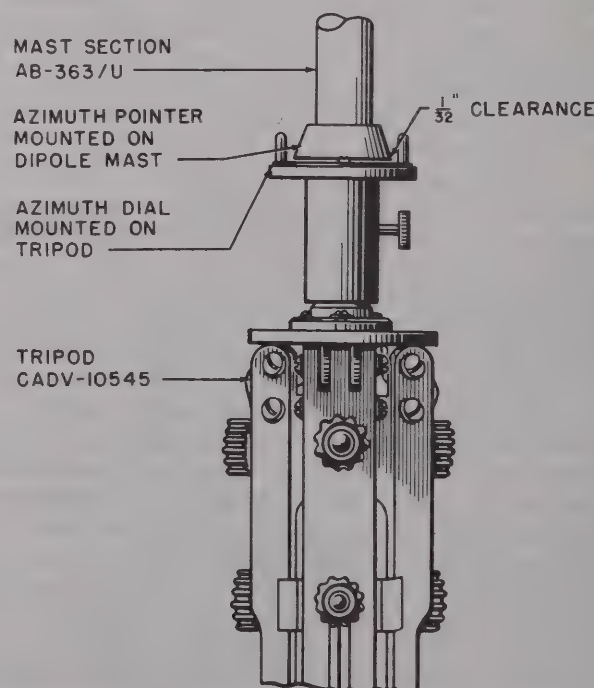



**Figure 3-8. Azimuth Dial Assembly Mounted on Tripod CADV-10545**

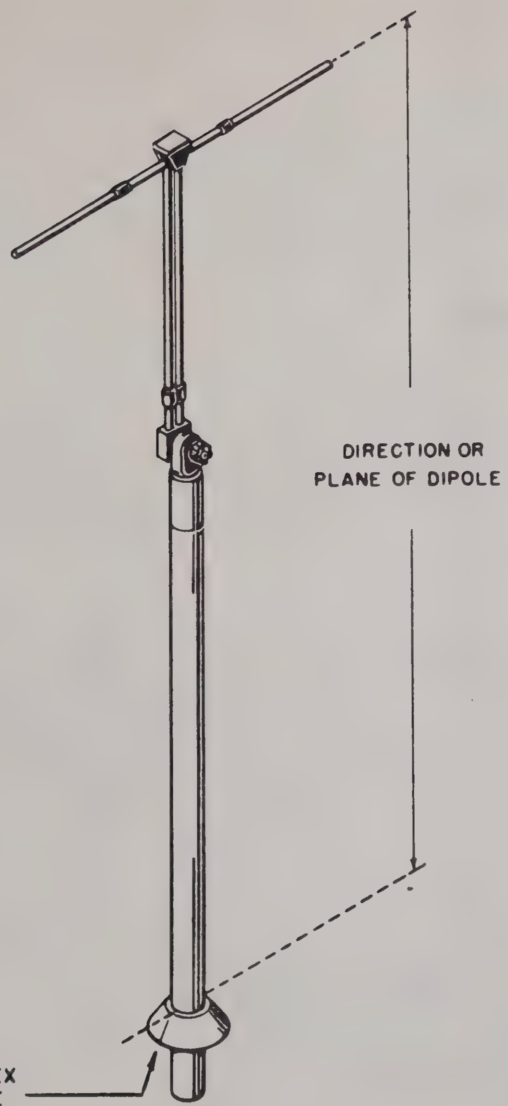



***Figure 3-9. Method of Checking the Dial Pointer for Angular Position***

Wipe all units and accessories with a dry cloth before stowing in the cases. This applies in particular to the tripod. In order to properly stow the tripod and to protect the sighting pins on the azimuth dial, invert the dial over the sleeves on the tripod head. Insert a finger in the azimuth dial assembly to compress the internal leaf spring. The base of the azimuth dial will then fit into the recess in the top of the tripod bag. Place the various units in the cases exactly as shown in figures 1-2, 1-4, and 1-6.

**CAUTION**

The carrying cases are drip-proof but were not designed to withstand severe exposure to the elements. Cases should be covered with tarpaulin when left in the open over night.

*b.* PACKING IN SHIPPING CASE. – The three carrying cases are not intended to be sufficient packing for transport by common carrier. Pack the carrying cases in the original shipping case as shown in figure 3-1. If the original shipping case was not retained, construct one according to data in figure 3-1. Use ¾-inch lumber and provide the required waterproof barriers and celulose wadding.

# SECTION 4

# OPERATION

## 1. INTRODUCTION.

Radio Test Set AN/URM-17A is basically a meter intended for intensity measurements of all types of radio frequency energy in the radio frequency spectrum between 375 and 1000 megacycles.

The Radio Interference-Field Intensity Meter IM-52A/URM-17 includes a sensitive receiver and a vacuum-52A tube voltmeter (VTVM) section. It also contains internal means for standardizing the receiver gain.

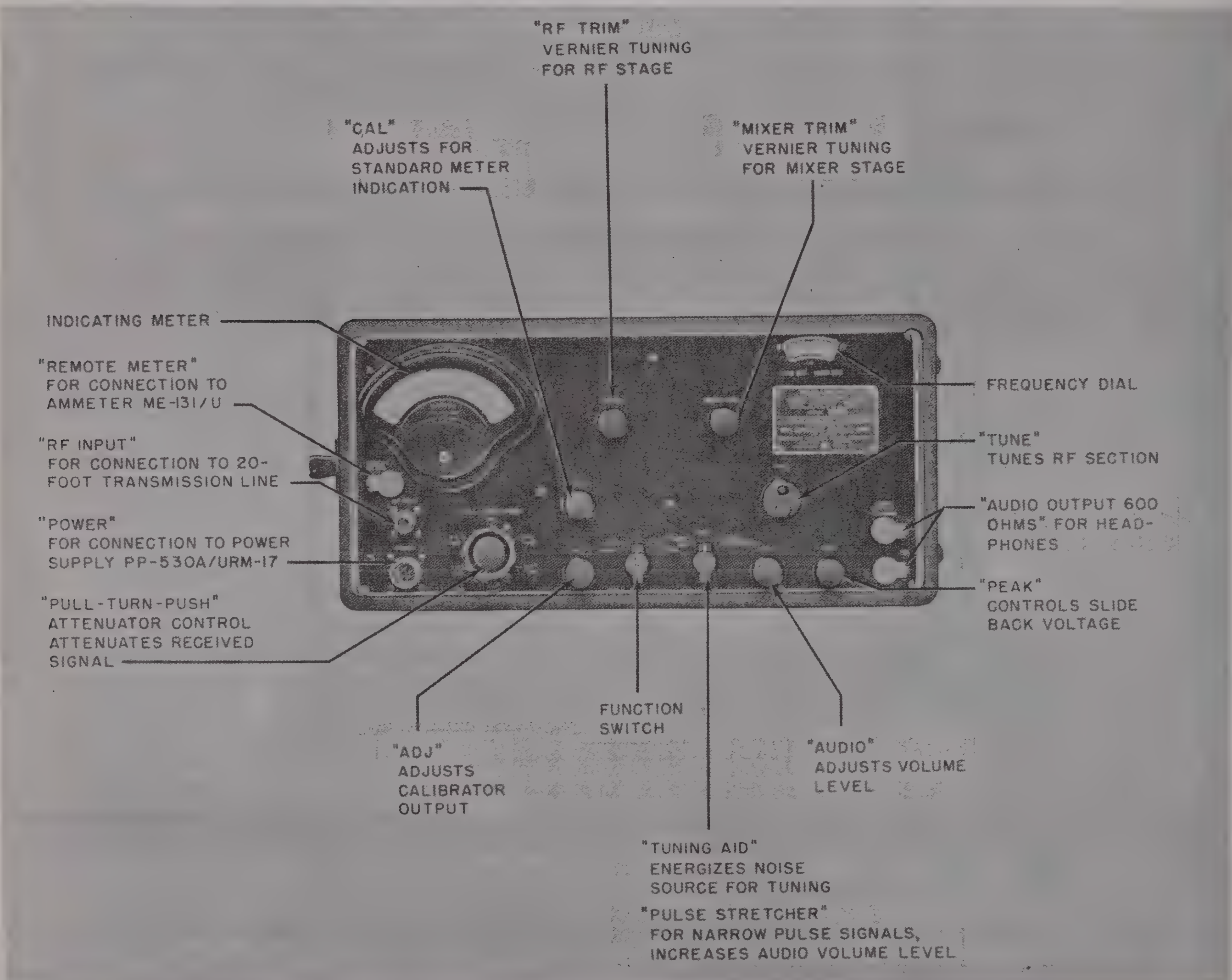



*Figure 4-1. Radio Interference-Field Intensity Meter IM-52A/URM-17, Panel Controls and Receptacles*

RF voltage from 10 microvolts to 10 volts may be measured. In terms of field intensity, 100 microvolts per meter to 100 volts per meter (depending on frequency) may be measured.

In operation, the type of measurement is selected by means of the function switch. The FI (Field Intensity) function of the meter affords measurement in terms of the average value, the QP (quasi-peak) function derived by the use of a weighted detector circuit, and the PEAK function in terms of the peak value effect of the signal or interference at the second detector.

The RI-FI Meter measures the *effect* of the peak value of an interfering pulse. It does not measure absolute peak value of the pulse because such response is dependent upon the effective bandwidth, the energy of the impulse (product of amplitude and duration), and the second detector characteristics of the measuring equipment. The duration of the impulse, after passing through the various tuned circuits, is roughly proportional to the reciprocal of the RI-FI Meter effective bandwidth. The envelope of the pulse applied to the second detector differs from the input impulse envelope. Its peak amplitude is less than that of a sine wave signal having the same peak value as the original impulse. Tuned circuits in the RI-FI Meter shape the pulse so that its peak amplitude is decreased and its duration is lengthened. The RI-FI Meter integrates the spectrum of the impulse over the pass-band around the signal frequency and measures the peak value of the shaped impulse. This value can be converted to a per-kilocycle-bandwidth basis by application of a factor depending upon the bandwidth of the RI-FI Meter at the measured frequency. When expressed in terms of per-kilocycle-bandwidth, the result may be correlated with similar readings obtained from other measuring equipment expressed in the same units.

## 2. EQUIPMENT CONTROLS AND RECEPTACLES.

*(See figures 4-1 and 4-2.)*

The operating controls of the Radio Interference-Field Intensity Meter IM-52A/URM-17 are all located on the front of the equipment. Likewise, the receptacles to which external connections are made are also on the front panel.

The function of each control and receptacle is briefly described by an adjacent panel marking or by panel markings identifying the various control positions. In table 4-1, the panel marking or legend is explained and the applicable symbol designations is given in parentheses after the legend for aid in identifying the circuit component.

### TABLE 4-1. DESIGNATION AND FUNCTION OF PANEL CONTROLS AND RECEPTACLES

**ON THE RI-FI METER**

| Legend | | Function |
|---|---|---|
| REMOTE METER (J-101) | | Receptacle for external meter connection. |
| RF INPUT (J-107) | | Receptacle for connection to RF Cable Assembly CG-92D/U (20′ 0″). |
| POWER (J-104) | | Operating power input. |
| PULL-TURN-PUSH (S-101 and S-104, E-115 through E-120) | | Attenuator control knob. |
| CAL | | Blanks RF input to receiver and connects calibrating oscillator to receiver input. |
| X10 | +20 db | Does not attenuate R.F. or I.F. signal. Does include a X10 factor of 20 db to correct for output meter scale markings. |
| $X10^2$ | +40 db | Does not attenuate R.F. signal. Attenuates I.F. signal 10 times or 20 db. Includes a X10 factor or 20 db to correct for output meter scale markings. |
| $X10^3$ | +60 db | Attenuates R.F. signal 10 times or 20 db. Attenuates I.F. signal 10 times or 20 db. Includes a X10 factor or 20 db to correct for output meter scale markings. |
| $X10^4$ | + 80 db | Attenuates R.F. signal 100 times or 40 db. Attenuates I.F. signal 10 times or 20 db. Includes a X10 factor or 20 db to correct for output meter scale markings. |

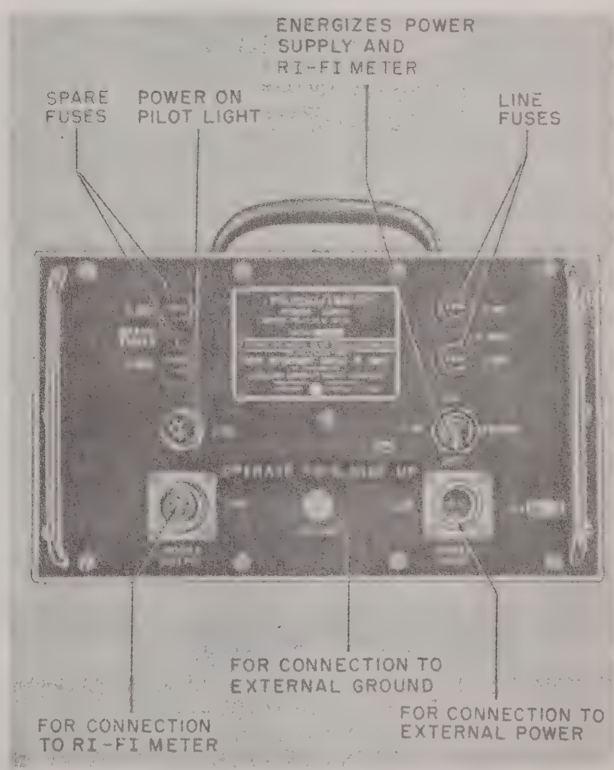



**Figure 4-2. Power Supply PP-530A/URM-17, Panel Controls and Receptacles**

**TABLE 4-1. DESIGNATION AND FUNCTION OF PANEL CONTROLS AND RECEPTACLES (Cont'd)**

| Legend | Function |
|---|---|
| X10⁵ +100 db | Attenuates R.F. signal 1000 times or 60 db. Attenuates I.F. signal 10 times or 20 db. Includes a X10 factor or 20 db to correct for output meter scale markings. |
| TUNE | Operates ganged butterfly assemblies to vary tuning of RF, local oscillator, and mixer stages. |
| RF TRIM | Operates cam in ganged tuning mechanism for independent vernier tuning of RF stage. |
| MIXER TRIM | Operates cam in ganged tuning mechanism for independent vernier tuning of mixer stage. |
| CAL (R-136) | Adjusts gain of IF section to standardize receiver gain. |
| ADJ (R-183) | Fine adjustment for output level of calibrating oscillator. |
| Function Switch (S-102) | |
| ADJ position | Position used for adjusting calibrating oscillator output. Places calibrator circuit in operation and connects indicating meter to measure calibrator output. |
| CAL position | Position used for standardizing receiver gain. Places calibrator circuit in operation and connects indicating meter to receiver output. |
| FI position | Weights signal for field intensity measurements. |
| QP position | Weights signal for quasi-peak measurements. |
| PEAK position | Furnishes D.C. to detector for slide-back voltage measurements. |
| TUNING AID PULSE STRETCHER | |
| TUNING AID position | Energizes source of RF interference at RF input of receiver as an aid in tuning RF section. |
| PULSE-STRETCHER position | Increases audio volume level when tuning narrow pulse signals. |
| OFF position | Disables RF interference source and pulse stretcher circuit. |
| AUDIO (R-213) | Controls aural (headphones) monitoring level. |
| PEAK (R-170) | Furnishes slide back voltage for measuring peak voltages. |
| AUDIO OUTPUT 600 OHMS (J-102 and J-103) | Headphone receptacles for aural monitoring. |
| **ON POWER SUPPLY PP-530A/URM-17** | |
| POWER OUTPUT (J-301) | Receptacle for operating potential supply to RI-FI Meter. |
| GROUND | Ground post for connection to external ground. |
| POWER INPUT (J-302) | Receptacle for power input from external source. |

**TABLE 4-1. DESIGNATION AND FUNCTION OF PANEL CONTROLS AND RECEPTACLES (Cont'd)**

**ON POWER SUPPLY PP-530A/URM-17**

| Legend | Function |
|---|---|
| POWER (S-301) | |
| ON | Energizes the equipment. |
| OFF | De-energizes the equipment. |
| I-301 | Power-on indicator. |
| F-301 | 2 Ampere active line fuses. |
| F-302 | |
| F-303 | 2 Ampere spare fuses. |
| F-304 | |

## 3. DESCRIPTION OF CHART PT-430/URM-17A

*(See figures 4-5 through 4-8.)*

Chart PT-430/URM-17A consists of a series of six (6) vinylite sheets containing simplified operating instructions and a family of calibration curves that are plotted *for each individual* Radio Interference-Field Intensity Meter IM-52A/URM-17.

The first two sheets simplified operating instructions of PT-430/URM-17A supply for the proper use of the curves on the succeeding sheets.

**Note**

Sample curves are plotted in the chart illustrations given here. *Do not use these sample charts while making measurements.*

Correction factors to be applied to the meter readings obtained at any given frequency and attenuator setting are determined from Charts #1 and #2. Each chart contains two curves, one for the X10 and X10² positions of the attenuator control and the other for the X10³, X10⁴, and X10⁵ positions. Chart #1 *(see figure 4-5)* is used for field intensity measurements when the dipole antenna is connected to the RI-FI meter. It includes both the sensitivity factor and the dipole factor. The sensitivity factor is the correction factor of Chart #2 and the dipole factor is shown in Figure 7-12. Chart #2 *(see figure 4-6)* is used for two terminal voltmeter measurements when the R-F Probe DT-194/URM-17A is connected to the RI-FI Meter. Chart #2 is a plot of the sensitivity factors vs. frequency.

The curve of Chart #3 indicates the "Impulse Bandwidth" in kilocycles. The effective "Random Noise" bandwidth can be determined by bandwidth by a factor of 0.74. The 6 db bandwidth can be determined multiplying the effective "Impulse" bandwidth by a factor of 0.95. Different types of signals react differently to bandwidth. Several factors are involved in converting to microvolts-per-kilocycle bandwidth or microvolts-per-meter-per-kilocycle bandwidth. These factors are discussed in detail in subparagraph (1) RATIONALIZING OF INTERFERENCE DATA.

Chart #4 *(see figure 4-8)* is a correction chart used for determining a true measurement of sine wave signal strength in the presence of high ambient interfer-

ence of a random nature. Two measurements taken in the FI position of the FUNCTION switch are required —one of the signal plus noise and one of the background noise. The chart is based on the formula:

$$\text{Sine Wave Signal Strength} = \sqrt{\left(\begin{matrix}\text{Meter reading}\\ \text{of noise plus}\\ \text{signal}\end{matrix}\right)^2 - \left(\begin{matrix}\text{Noise}\\ \text{reading}\end{matrix}\right)^2}$$

(1) RATIONALIZING OF INTERFERENCE DATA.

It may be observed that a difference in meter indication may exist between two RI-FI Meters in the same location measuring the same noise signal. It is the purpose of the following paragraphs to explain and provide correction factors for this effect.

**Note**

Intensity of broadband interference can vary rapidly with frequency. A one percent difference in the dial frequency calibration of two equipments is a 10 megacycle tuning difference at a test frequency of 1000 megacycles.

Variations in the "Q" of tuned circuits, in tube loading, in individual electron tube characteristics, and slight tracking differences are normally present in all equipments of this type. For this reason variations in the overall bandpass of equipments are present.

This problem may be resolved by converting the meter reading into microvolts-per-kilocycle bandwidth as a two-terminal voltmeter and into microvolts-per-meter-per-kilocycle bandwidth as a field intensity meter.

If the bandwidth is other than one megacycle, then the conversion factor (K), by which the meter reading is to be multiplied, will depend upon the type of signal and the bandwidth, as shown below.

(a) In the case of a sine wave signal, the peak, average, and effective voltages are *independent* of bandwidth. The factor, applicable to readings taken in function switch positions *Field Intensity, Quasi Peak, and Peak* is therefore:

$$K = 1$$

For amplitude-modulated sine wave signals no correction is needed if sideband frequencies fall within the bandpass of the RI-FI Meter (see Chart #3).

For frequency-modulated signals no correction factor is needed if the range of frequency shift falls within the bandpass of the RI-FI Meter (see Chart #2).

(b) For a noise signal of a predominantly random nature, the peak and average voltages are proportional to the square root of the effective random noise bandwidth. The conversion factor, also applicable to readings taken in function switch positions *Field Intensity, Quasi Peak, and Peak is:*

$$K = \sqrt{\frac{1\ \text{Kc}}{\text{Effective random noise bandwidth in Kc}}}$$

For example: if the effective random noise bandwidth at the test frequency of 540 megacycles is 592 kilocycles, as obtained from Chart #3 *(Figure 4-7)* (800 Kc impulse bandwidth times 0.74), then the conversion factor would be:

$$K = \sqrt{\frac{1\ \text{Kc}}{592\ \text{Kc}}} = 0.0411$$

(c) When the noise signals are predominantly impulsive, the peak value of the voltage is directly proportional to the effective impulse bandwidth. The conversion factor given below is applicable ONLY to readings taken in the PEAK function switch position.

For example: if the effective impulse noise bandwidth at the frequency of 540 megacycles is 800 kilocycles as obtained from Chart #3, then:

$$K = \frac{1\ \text{Kc}}{800\ \text{Kc}} = 0.00125$$

Average and quasi-peak readings of impulse signals are also influenced by pulse repetition rate, pulse width, charge time of weighting circuits and the overload factor. For this reason, a definite conversion factor cannot be supplied.

The following chart will enable the operator to determine proper detector functions and multiplication factors to use in making various types of measurements.

**NOISE PLUS SIGNAL CHART**

| TYPE NOISE (1) | TYPE SIGNAL (2) | DETECTOR FUNCTION | DIRECT | *RMS |
|---|---|---|---|---|
| Random | Sine Wave | Field-Intensity<br>Quasi-peak | <br>X | X<br> |
| Random | Random | Field-Intensity<br>Quasi-peak | | X<br>X |
| Random | Impulse High Repetition | Field-Intensity<br>Quasi-peak | <br>X | X<br> |

*Note: Internal noise is of a random nature.*

**RMS = Root Mean Square, e.g.,* $\sqrt{[\text{signal (1)}]^2 + [\text{signal (2)}]^2}$

**Note**

Correction factors in all charts of Chart PT-430/URM-17A discussed here include the losses and reflections accountable to R-F Cable Assembly CG-92D/U (20′ 0″).

## 4. OPERATING INSTRUCTIONS.

*a.* INTRODUCTION.—Instructions for connecting the various input devices are given in Section 3, In-

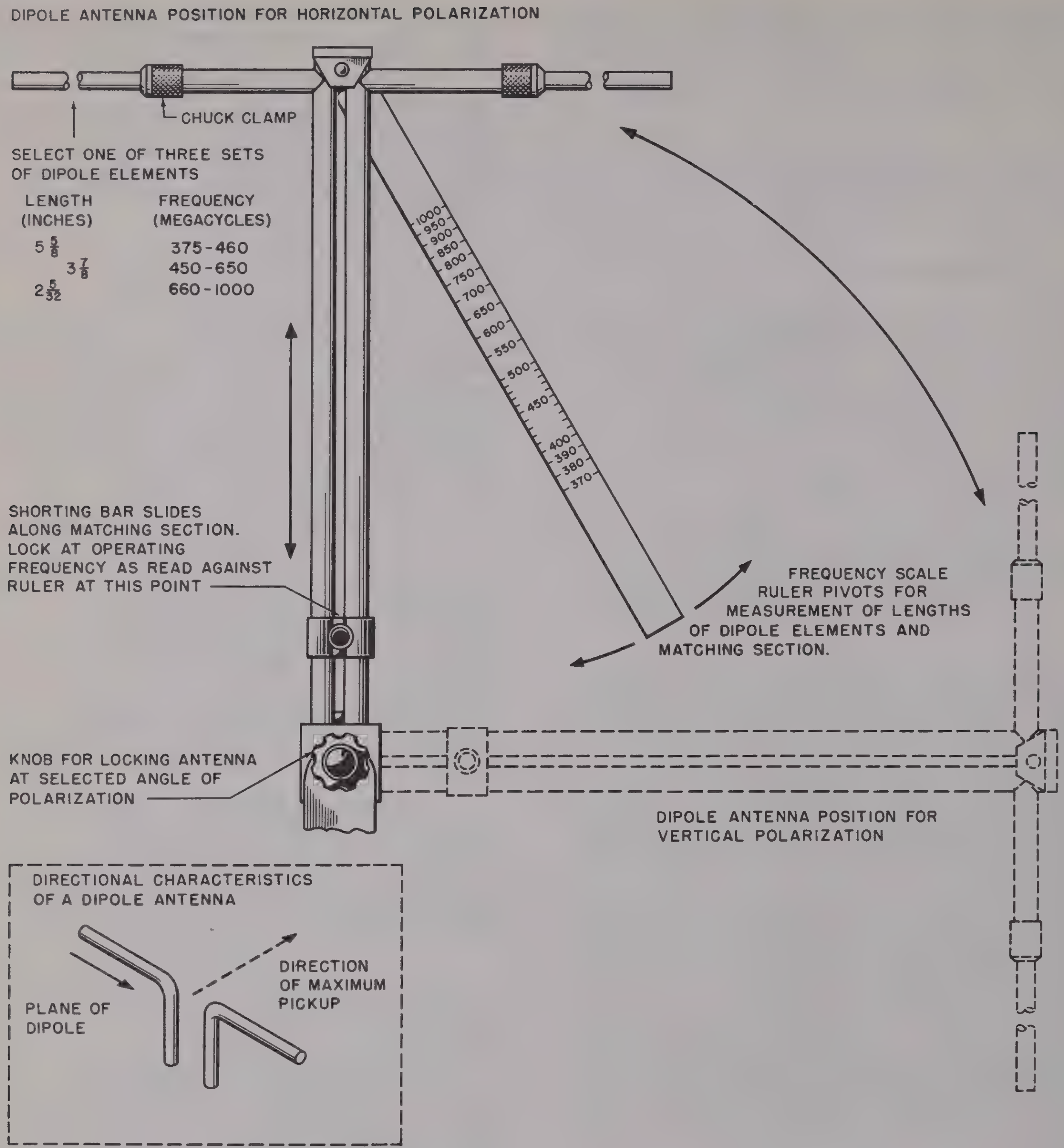



*Figure 4-3. Adjustment of Antenna AT-792/URM-17A*

stallation. In the procedures given here, only a statement of the type of input device required will be given.

**Note**

The word "signal" is used here to designate any R-F input to the equipment i.e., sine wave, random interference, or pulse interference.

The input devices comprise the dipole antenna and the RF probe. These units are *all* connected via the R.F. Cable Assembly CG-92D/U (20′ 0″) to the RF INPUT receptacle.

*b.* USE OF DIPOLE ANTENNA.—The dipole Antenna AT-792/URM-17A is used for field intensity and radio interference measurement, that is, for measuring the strength of the signal in microvolts per meter, and determining the approximate bearing of a signal source. The antenna must be adjusted for frequency, type of polarization, and incident angle of the received signal.

See figure 4-3 for illustration of dipole antenna adjustments. A plastic ruler, with a frequency scale printed on each side, is pivoted at the top of the antenna so that the length of dipole elements and the matching stubs can be adjusted to correspond with the operating frequency. For operation at 500 megacycles, for example, use the 3⅞-inch dipole elements. Unscrew the knurled chuck. Pivot the ruler to the axis of the element being adjusted. Slide the element in the chuck until the outer end coincides with the 500 megacycle index on the rule. Tighten the chuck and adjust the other dipole element in a similar manner. Pivot the ruler to the axis of the matching stubs. Loosen the lock screw on the shorting bar and adjust the upper edge of the bar to coincide with the 500 megacycle index on the rule. Tighten the lock screw.

The dipole antenna must also be adjusted to a position corresponding to the polarization of the received signal. Maximum pickup of horizontally polarized waves is obtained with the dipole in a horizontal plane; of vertically polarized waves with the dipole in a vertical plane. Waves of mixed polarization can be received with the dipole tilted at some angle between the horizontal and vertical.

The directional characteristics of a dipole antenna are such that a maximum pickup is obtained when the dipole is *broadside to the signal source.* Minimum pickup is obtained when the signal source is in line with the plane of the dipole.

After tuning the receiver to the frequency of the signal under measurement, adjust the length of the dipole elements to correspond to that frequency. Alternately adjust the antenna for polarization and azimuth to obtain a maximum meter reading. Do not make a measurement at this time, for the maximum is broad. Turn the antenna in azimuth until an aural null is obtained.

**Note**

In the presence of a strong signal the null will be difficult to obtain. Because sharpest nulls are obtained with the highest feasible attenuator setting, adjust the attenuator control setting as necessary to reduce the signal.

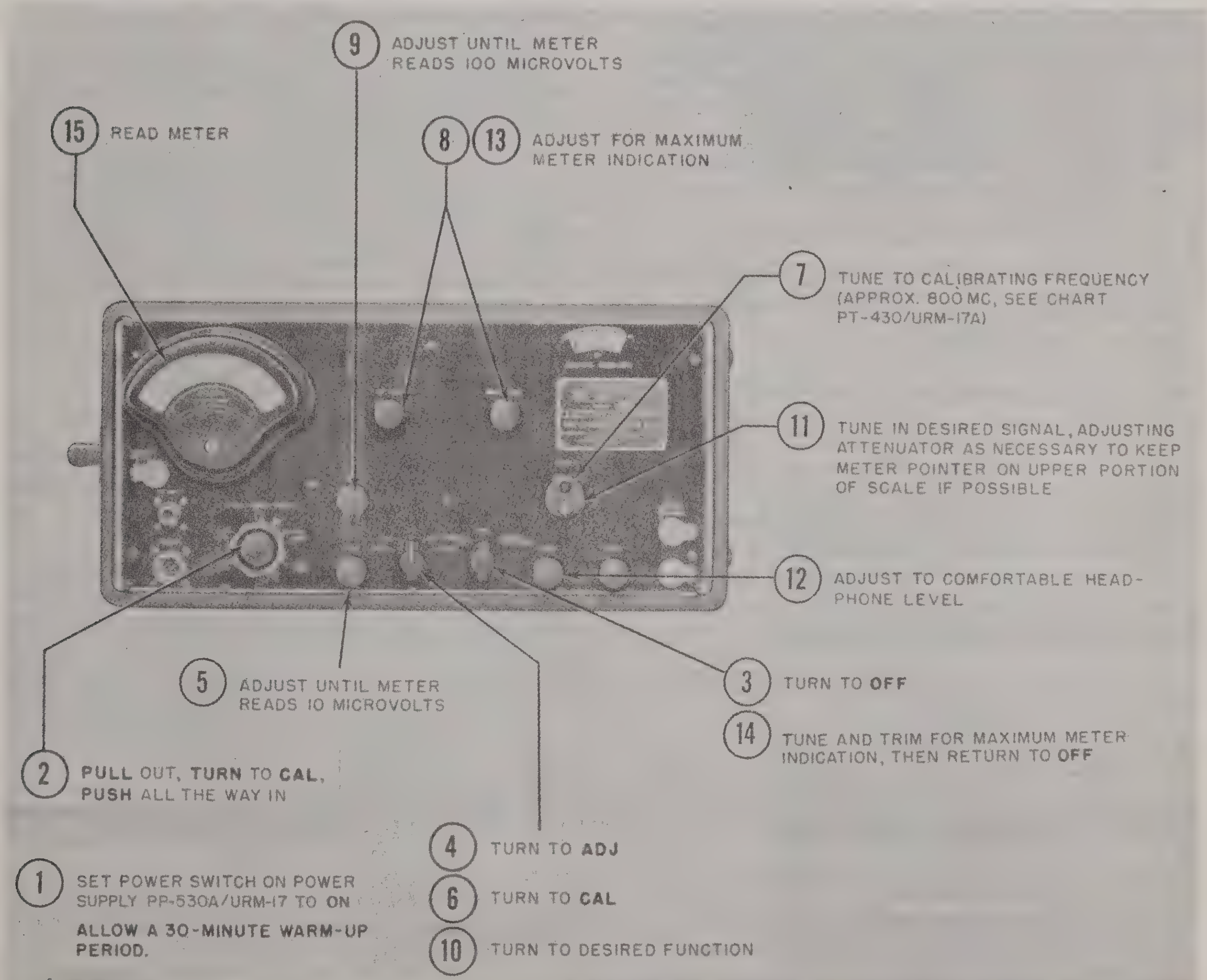



*Figure 4-4. Radio Interference-Field Intensity Meter IM-52A/URM-17, Simplified Operating Procedure*

Use the meter in conjunction with headphones to obtain the null indication when there is high acoustical noise at the survey site.

Upon obtaining the null indication, read the approximate magnetic bearing to the signal source, as indicated by the azimuth pointer and azimuth dial.

**Note**

For a more precise bearing, correct the magnetic bearing for the degree of variation at the geographical location of the survey site. Bear in mind that bilateral bearings are obtained with this antenna. The ambiguity must be resolved by triangulation.

Rotate the dipole ninety degrees away from the null point, then make the measurement of the signal. This is required to give maximum signal input to the RI-FI Meter.

*c.* ADJUSTING EQUIPMENT FOR STANDARD GAIN. *(See figure 4-4.)*—This function is accomplished by adjusting the calibrating voltage output from the internal calibrator circuit for a meter reading of 10 microvolts. This voltage is then applied to the RF input of the equipment and the CAL control is manually adjusted to give a meter reading of 100 microvolts. Accurate measurements can be made only after the equipment has been adjusted for standard gain.

**Note**

For best results, allow a 30-minute warm-up period after turning the power on.

Step 1. PULL attenuator knob out, TURN to CAL position, PUSH all the way in.

**Note**

The attenuator knob must always be pushed all the way in to avoid discontinuity at the coaxial connectors of the attenuator. Such discontinuity adversely affects the standing wave ratio and degrades the attenuation.

Step 2. Turn TUNING AID-PULSE STRETCHER switch to OFF.

Step 3. Turn function switch to ADJ.

Step 4. Set ADJ control for meter reading of 10 microvolts.

Step 5. Turn function switch to CAL.

Step 6. Tune to calibrating frequency, approximately 820 megacycles. Adjust RF TRIM, MIXER TRIM for maximum meter reading.

Step 7. Repeat step 6 for improved accuracy.

Step 8. Adjust CAL control very slowly until the meter reads 100 microvolts.

**Note**

When an unusual CAL control setting is encountered, the most probable cause is incorrect voltage from the power source. Check and correct as necessary.

*d.* SIGNAL MEASUREMENT.

Step 1. Turn function switch to the desired position.

**Note**

Use the FI (field intensity) position for average values of either sine wave field intensity or radio interference measurements. The QP (quasi-peak) position is used in radio interference measurements to obtain a "weighted" near-peak value. Use the PEAK position to measure the peak value of a radio interference signal as seen by the second detector.

Step 2. Tune in desired signal. Tune CW signals for maximum meter reading using the TUNE, RF TRIM, and MIXER TRIM controls. *The trimmer knobs may require several full turns to reach maximum meter reading.*

Step 3. When measuring interference, set the tuning dial to the desired frequency, then trim for maximum meter reading.

Step 4. To peak trimmer controls in absence of signal, set TUNING AID-PULSE STRETCHER switch to TUNING AID (function switch must be in QP position). Tune RF TRIM and MIXER TRIM for maximum meter reading. Return TUNING AID-PULSE STRETCHER switch to the OFF position.

**Note**

The TUNING AID-PULSE STRETCHER switch must always be in the OFF position before meter readings are noted and recorded.

Step 5. Adjust position of attenuator control by a PULL-TURN-PUSH sequence to select appropriate attenuation that results in a meter reading in the upper portion of the scale where practicable.

Step 6. Read indicating meter in microvolts per meter when the dipole antenna is used. Compute the value of the measured signal as follows: Consult Chart #1. Select the proper chart as determined by the attenuator setting used in making the reading. Enter the chart from the bottom at the frequency of the signal being observed. Follow upward to intersect the plotted curve. From the point of intersection, follow to the left to find the correction factor. Multiply the meter reading by this factor and by the attenuator setting to obtain the corrected reading in microvolts-per-meter. *(Example: Assume attenuator control setting is $X10^2$ and meter reading is 70 microvolts on a 540-megacycle signal. Entering the upper curve of Chart #1 at 540 megacycles, a correction factor of 7 is obtained. Then $70 \times 7 \times 10^2 = 49{,}000$ microvolts per meter.)*

Step 7. Read indicating meter in microvolts when the RF probe is used. Compute the value of the measured signal as follows: Consult Chart #2. Select the proper chart as determined by the attenuator setting used in making the reading. Enter the chart from the bottom at the frequency of the signal being observed. From the point of intersection follow to the left to find the correction factor. For direct connection to a 50-ohm circuit or through the R.F. Probe DT-194/URM-17A, multiply the meter reading by this factor and the attenuator setting to obtain the corrected reading in microvolts. *(Example: Assume attenuator control setting is X10² and meter reading is 70 microvolts on a 910-megacycle signal. Entering the upper curve of Chart #2 at 910 megacycles, a correction factor of 0.75 is obtained. Then 70 x 0.75 x 10² = 5250 microvolts.)*

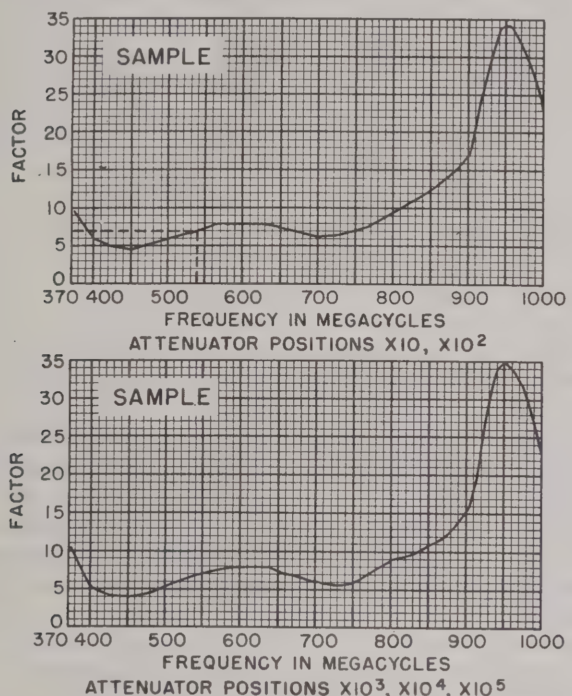



**Figure 4-5. Chart PT-430/URM-17A, Chart #1, Correction Factors For Use With Antenna AT-792/URM-17A**

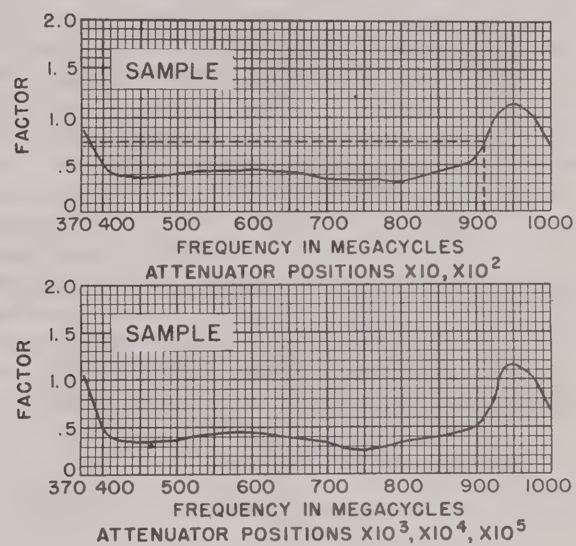
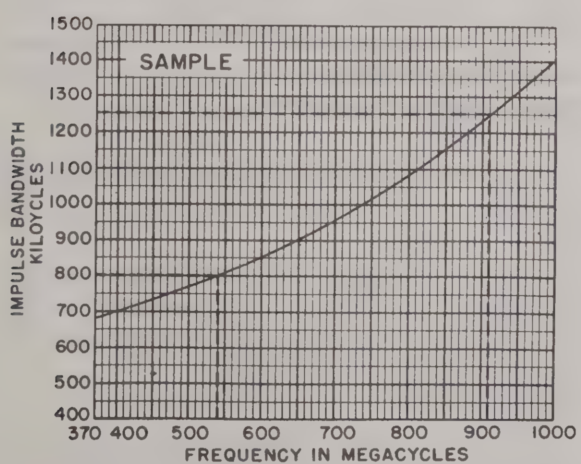



**Figure 4-6. Chart PT-430/URM-17A, Chart #2, Correction Factors For Use With RF Probe DT-194/URM-17A**




THE EFFECTIVE "RANDOM NOISE" BANDWIDTH CAN BE DETERMINED BY MULTIPLYING THE EFFECTIVE "IMPULSE" BANDWIDTH BY A FACTOR OF 0.74.
THE 6 DB BANDWIDTH CAN BE DETERMINED BY MULTIPLYING THE EFFECTIVE "IMPULSE" BANDWIDTH BY A FACTOR OF 0.95.

**Figure 4-7. Chart PT-430/URM-17A, Chart #3,**

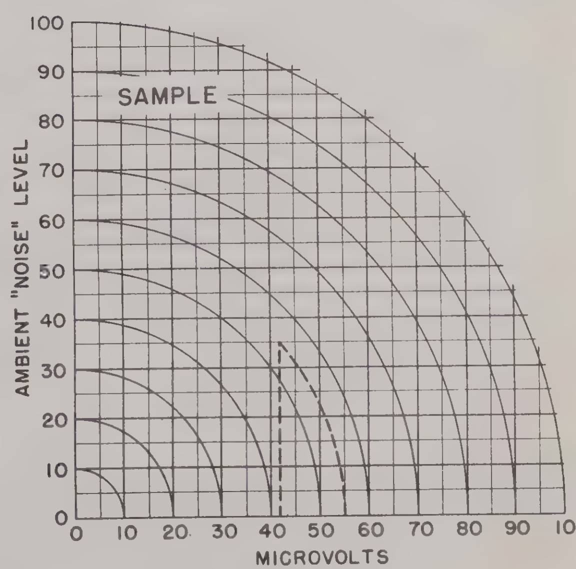



**Figure 4-8. Chart PT-430/URM-17A, Chart #4, Correction Chart for Sine Wave Signals of High Ambient Interference of Random Nature**

*e.* RADIO INTERFERENCE MEASUREMENT. — The slide back VTVM circuit is used for measurement of the effective peak value of random or impulse interference.

Step 1. Turn the function switch to PEAK.

Step 2. Turn the PEAK control completely counterclockwise.

Step 3. Adjust position of attenuator control by a PULL-TURN-PUSH sequence to select appropriate attenuation that results in a meter reading in the upper portion of the scale, where practicable.

Step 4. Adjust the AUDIO control for a convenient headphone signal level. Slowly turn the PEAK control clockwise until the received headphone signal just becomes inaudible. If necessary, advance the AUDIO control to a high level to facilitate establishment of this threshold point. Do not advance the PEAK control beyond the point of inaudibility, or an erroneous indication will result. Observe the pointer of the indicating meter as the point of inaudibility is approached. If the pointer goes off-scale, advance the attenuator control to the next higher position and return the PEAK control to its fully counterclockwise position. Then repeat the adjustment of PEAK and AUDIO controls to determine the point of inaudibility.

**Note**

Take into account the slight lag in the effect of the PEAK control.

Step 5. Read the indicating meter. The meter reading is equivalent to a bias voltage (introduced by PEAK control) that is identical to the peak value of the input signal as shaped by the selectivity characteristics of the receiver. Compute the effective peak value of the measured signal by applying the attenuator factor and correction factors obtained from Charts #1 or #2. *(Example 1: Assume dipole antenna in use, receiver frequency is 540 megacycles, attenuator control is $X10^2$, and meter indication is 70 microvolts. Entering the upper curve of Chart #1 at 540 megacycles, a correction factor of 7 is obtained. Then $70 \times 7 \times 10^2 = 49{,}000$ microvolts-per-meter. Example 2: Assume R. F. Probe DT-194/URM-17A in use, receiver frequency is 910 megacycles, attenuator control is $X10^2$, and meter indication is 70 microvolts. Entering the upper curve in Chart #2, a correction factor of 0.75 is obtained. Then $70 \times 0.75 \times 10^2 = 5250$ microvolts.*

Step 6. A discussion of converting radio interference measurements to terms of microvolts-per-meter-per-kilocycle-bandwidth or microvolts-per-kilocycle bandwidth is given in paragraph 3 of this section. To convert the peak radio interference measurement obtained in step 5 above to terms of microvolts-per-meter-per-kilocycle-bandwidth or microvolts-per-kilocycle bandwidth, refer to Chart #3. *(See figure 4-7.)* Enter the chart from the bottom at the frequency of the signal being observed. From the point of intersection follow to the left to find the effective impulse bandwidth. *(Example 1: Assume a measurement of impulse type interference with dipole antenna in use, receiver frequency is 540 megacycles, attenuator control is $X10^2$, and meter indication is 70 microvolts. The correction factor from Chart #1 for 540 megacycles is 7. Entering Chart #3 at 540 megacycles, an impulse bandwidth of 800 kilocycles is obtained. The conversion factor is 1.0 Kc divided by 0.8 Kc equals 0.00125. Then, $70 \times 7 \times 10^2 \times 0.00125 = 61.25$ microvolts-per-meter-per-kilocycle bandwidth. Example 2: Assume a measurement of random interference with R.F. Probe DT-194/URM-17A in use, receiver frequency is 910 megacycles, attenuator control is $X10^2$, and meter indication is 70 microvolts. The correction factor from Chart #2 is 0.75 for 910 megacycles. Entering Chart #3 at 910 megacycles, an impulse bandwidth of 1250 kilocycles is obtained. The effective random noise bandwidth is $1250 \times 0.74 = 925$ Kc. The conversion factor is:*

$\sqrt{1.0 \text{ Kc}/925 \text{ Kc}} = 0.0329$. Then $70 \times 0.75 \times 10^2 \times 0.0329 = 172.72$ microvolts-per-kilocycle bandwidth.

*f.* SINE WAGE SIGNAL MEASUREMENTS IN THE PRESENCE OF HIGH AMBIENT INTERFERENCE.—When a sine wave signal is being measured in the presence of high ambient interference of random nature, it is possible to correct for the interference and determine the actual intensity of the signal as though the random interference were not present. Obtain the value of interference and signal combined and the value of "noise only." The "noise only" figure may be obtained by turning off the signal, if possible, or detuning slightly. Monitor with the headphones to determine how far to detune. When using the QP function, subtract the value of "noise only" directly from the value of interference and signal combined. When using the FI function, proceed as follows:

Step 1. Standardize the gain of the equipment for the frequency of the incoming signal by going through steps 1 to 8 of paragraph 4*c*.

Step 2. Set the function switch to FI.

Step 3. Note the meter reading of the random interference in the absence of signal. If necessary, detune slightly off signal.

Step 4. Tune in signal and note meter reading of signal and random interference combined.

Step 5. In Chart #4, *(see figure 4-8)* locate the meter reading of "noise plus signal" on horizontal scale of chart. *(Example: Assume 55 microvolts.)*

Step 6. Follow the arc upward until it intersects the horizontal line which represents the "noise only" meter reading. *(Example: 35 microvolts.)*

Step 7. Drop down from the point of intersection to the horizontal scale and read off the corrected meter reading. This is the value of the signal in absence of the random interference. *(Example: 43 microvolts.)*

## 5. SUMMARY OF OPERATION.

The following is a summary of Radio Test Set AN/URM-17A operation and is similar to the instructions presented on the first two sheets of Chart PT-430/URM-17A.

*a.* The word "signal" is used here to designate any RF input such as sine wave, random interference, or pulse interference. Signal inputs to the equipment are of two types. The first includes the use of the equipment as a two terminal voltmeter in making conducted measurements. This may be by direct connection to a 50-ohm coaxial circuit. Conductive measurements on lines carrying ac or dc voltages up to 1000 volts peak may be made by inserting the DT-194/URM-17A RF Probe in series between the 20 foot RF input line and the line being measured. If other impedances are connected to the input, the meter readings will be relative, not actual values.

The second type input is a Field Intensity Meter using the AT-792/URM-17A Dipole Antenna as a calibrated pickup device. Field Intensity measurements are made with the antenna rotated for maximum response in the plane of polarizations desired. Adjust the dipole length and shorting clip within ± 1/16 inch of the calibration data on the ruler for most accurate results.

*ALL* correction factors for either conductive or radiated measurements include the losses and reflections in the CG-92D/U (20′ 0″) RF Transmission Line. On conductive measurements it is assumed that the device being tested presents a carefully matched 50-ohm input to the equipment.

*b.* ADJUSTING EQUIPMENT FOR STANDARD GAIN.

Step 1. PULL attenuator knob out, TURN to CAL position, PUSH all the way in.

Step 2. Rotate TUNING AID switch to OFF.

Step 3. Rotate function switch to ADJ.

Step 4. Set ADJ control for meter reading of 10 microvolts.

Step 5. Rotate function switch to CAL position.

Step 6. Tune to calibrating frequency, approximately 820 mc; adjust TUNE, RF TRIM, MIXER TRIM controls for maximum response.

Step 7. ADJUST CAL control until meter reads 100 microvolts.

Step 8. The equipment is now adjusted for standard gain. The CAL control setting should NOT be changed until the RI-FI meter is again standardized.

*c.* TUNING SIGNAL.

Step 1. Rotate function switch to QP. (If impulse interference of low repetition rate is encountered use Peak function switch position instead of QP).

Step 2. Leave RF and MIXER trimmers in position left after adjusting equipment for standard gain and tune slowly across the band.

Step 3. If the signal is too small to be detected by the scanning method of step 2, RF TRIM, and MIXER, TRIM controls should be adjusted every 50 megacycles of the tuning dial with TUNING AID on. Return TUNING AID switch to OFF.

Step 4. When signal or maximum interference is encountered tune RF TRIM and MIXER TRIM controls for maximum response before taking measurements.

*d.* MEASURING SINE WAVE SIGNALS.

Step 1. Rotate FUNCTION switch to FI for an RMS reading of C-W signals or to QP when carrier plus modulation is to be measured.

Step 2. PULL-TURN-PUSH attenuator knob to select appropriate attenuation for meter reading in upper portion of the scale where possible.

Step 3. When using the dipole antenna multiply the meter reading in microvolts by the antenna correction factor from Chart #1. Multiply the result by the attenuator setting to obtain final corrected value in microvolts-per-meter.

Step 4. For conductive measurements, multiply the meter reading in microvolts by the correction factor from Chart #2. Multiply the result by the attenuator setting to obtain final corrected value in microvolts.

Step 5. When a sine wave signal is being measured in the FI function in the presence of high ambient interference of a random nature, it is possible to correct for the interference and determine the actual value of the signal as though interference were not present. Refer to Chart #4.

*e.* MEASURING BROADBAND INTERFERENCE.

Step 1. Rotate FUNCTION switch to FI for an equivalent RMS reading of interference, to QP for a "nuisance" value reading and to PEAK for a peak value reading.*

Step 2. PULL-TURN-PUSH attenuator knob to select the appropriate attenuation for a meter reading in the upper portion of the scale where possible.

Step 3. When taking a PEAK measurement, slowly adjust the PEAK control until interference just ceases to be heard in the headphones with the audio control fully clockwise. Adjust the attenuator as required. Adjust PEAK control carefully back and forth at the threshhold point for improved accuracy.

Step 4. When using the dipole antenna, multiply the meter reading in microvolts by the antenna correction factor from Chart #1. Multiply the result by the attenuator setting to obtain final corrected value in microvolts-per-meter.

Step 5. For conductive measurements, multiply the meter reading in microvolts by the correction factor from Chart #2. Multiply the result by the attenuator setting to obtain the final corrected value in microvolts.

*This equipment has been calibrated in terms of RMS of a sine wave (0.707 of true peak of a sine wave). Peak values are therefore in terms of RMS of a sine wave which would have the same peak amplitude as the signal that appears at the second detector input.

Step 6. To obtain per-kilocycle values divide the corrected values from steps 4 and 5 by the impulse bandwidth. Refer to Chart #3 for bandwidth data.

## 6. USE AS A SENSITIVE RADIO FREQUENCY ELECTRONIC MICROVOLTMETER.

Radio Interference-Field Intensity Meter IM-52A/URM-17 is a selective highly sensitive two terminal voltmeter. By considering the applications carefully, it can be used as listed below.

*a.* It can be used as a null instrument in conjunction with r.f. bridges suitable for operation in the 375 to 1000 megacycle band of frequencies. Extremely short leads, preferably shielded, must be used and extreme care must be taken to assure proper impedance matches.

*b.* It can be used to measure the gain of a radio frequency stage in radio equipment by measuring the signal input to the stage and the signal output of the stage. The R.F. Probe DT-194/URM-17A must be used and it should be noted that this shunts approximately 50 ohms across the circuit and may upset the stage under test.

*c.* It can be used to check the voltage of any 50-ohm transmission lineup to 10 volts, provided the transmission line is properly terminated.

**Note**

The RF probe voltage rating is 1000 volts AC.

*d.* It can be used to determine the loss in a coaxial line connected to a signal generator by comparing the signal level at the input and output ends of the line. The appropriate impedance matching network must be used between the line and the RI-FI Meter.

## 7. SURVEY CONSIDERATIONS.

*a.* FIELD INTENSITY CONSIDERATIONS. — A knowledge of the fundamentals of wave propagation is essential in order to properly conduct field intensity surveys. The study of wave propagation is highly complicated by the large number of variable factors that must be considered and by the interpretation of the results of a series of measurements. This section of the instruction book contains a brief description of some of these factors as they apply to the frequency range covered by Radio Test Set AN/URM-17A.

To secure meaningful and interpretable results, a field intensity survey must be well-planned. The necessary schedules should be arranged and coordinated with all participating units and personnel well in advance of the date of the tests. Adequate spare parts and supplies should be available, especially if the project is such that it may be impossible to obtain repeat transmissions. It is a good plan to carry duplicate equipments for such a project, when possible.

If measurements are to be continued away from the base station, over a period of several days, a check-off list of accessories to be taken along should be carefully prepared. Such a list would include items such as recorders, recorder charts and ink, pencils, flash lamps, spare batteries, wire, electronic repair kit, multimeter, battery clips, road maps, topographical charts, compass, slide rule, thermos bottles, first aid kit, paper towels, hand axe, power supply spares, necessary accessories and spares for the vehicle, arrangements for obtaining gas and oil, spare vehicle keys, food and water, etc.

Because of the difference in the manner in which field intensity surveys and radio interference surveys are conducted, each will be treated separately.

(1) SELECTING THE SITE FOR FIELD INTENSITY MEASUREMENTS.—It is sometimes necessary to make field intensity measurements at a designated location, and it is then essential to consider the effect of surrounding objects on the received signal strength. Often, however, the measurement location can be selected, and the observer must then know what constitutes a good site for a given set of conditions. True radiation field measurements are made at distances greater than about two wavelengths from the transmitter in order to avoid the influence of the induction field. At these frequencies the antenna should be two or more wavelengths above the ground plane.

In selecting a site for field intensity measurements, the following considerations should be kept in mind: The radio-frequency voltage induced in a receiving antenna is proportional to the intensity of the electromagnetic field in the space occupied by the antenna. The intensity at this point will depend upon the radiated power; the frequency of the received signal; the distance from the transmitter; the attenuation over the path between the transmitter and the receiver; reflections and reradiations from nearby conductors, such as power lines, wire fences, and steel buildings; absorption by trees; and the effects of hills, gullies, or cliffs.

The ideal site would be an open, flat terrain at a considerable distance (1000 feet or more) from buildings, electric lines, fences, etc. Ideal sites are rare in the more populated sections of the country; therefore, it is good practice to check a proposed location by making measurements of the desired signal at several points in the vicinity. If the same value of field intensity is obtained at each of the points, any one may be considered satisfactory. If it is necessary to use an unsatisfactory site, a series of readings should be recorded at a number of different points in the neighborhood of the selected site, and detailed notes on the site conditions should be appended to the recorded data.

There are no fixed rules to govern the minimum distance between the field intensity measuring equipment and the nearest wire lines or other disturbing objects because possible resonances are unpredictable. Another consideration in site selection is the possible presence of local electrical interference sources which may make field intensity measurements difficult.

If measurements are to be made with the equipment mounted in a vehicle, it will be necessary to determine the effect of the vehicle on the received signal. This is done by measuring a signal with the equipment mounted in the vehicle as it is to be used and again with it temporarily located some distance away from the vehicle. If differences are noted, measurements should be taken with the vehicle heading changed 15 or 20 degrees at a time. The differences between the readings taken in the vehicle and those taken outside the vehicle are then plotted in percentages of the outside readings versus heading. A different curve will generally be needed for each operating frequency. A calibration of this type is facilitated by simultaneously using two similar equipments, one equipment set up in the open, and the other mounted in the vehicle and operated 50 to 75 feet away from the former.

(2) PROPAGATION OF ULTRA-HIGH FREQUENCIES. – Propagation of ultra-high frequency waves is similar to propagation of light waves in that the transmission is line-of-sight and is affected by reflection and refraction. In general, the receiving antenna must be in an unobstructed line with the transmitting antenna.

If a transmission path lies near a reflecting surface the energy picked up by the receiver antenna is made up of two components, one received directly from the transmitter antenna and the second reflected from the earth. The resultant of the direct and the reflected wave will depend not only on the difference in the length of the two paths but upon changes of phase or intensity introduced in the process of reflection. These phase or intensity changes result in breaking up the transmitted energy pattern into a lobe structure (not to be confused with polar plot of antenna directional characteristics). The longer the wavelength, the higher the lowest lobe is tilted upward from the surface of the earth. Hence, the energy received in an aircraft will be determined by its position relative to the maximum and minimum points of the lobe pattern.

Transmission in these frequencies is affected by refraction, the refraction resulting from vertical temperature gradients. For example, when land is heated by the sun and cools by radiation at night, a thin layer of dense cool air is formed just above the ground, resulting in a rapid decrease of refractive index with height. Refraction causes the transmitted wave to bend slightly in conformation with the contour of the earth.

A more widespread cause of strong vertical gradients in refraction index, and therefore of excessive bending of transmitted energy, is the refractive effect of water vapor. Over most of the surface of the ocean the region above the water is not saturated with water vapor, whereas the layer directly in contact with the water must be very nearly saturated. There is a continual evaporation of water from the sea and a diffusion of the vapor upward into the overlying air mass. Thus, there exists a vertical gradient in the concentration of water vapor with the highest concentration at the surface and decreasing upward. This tends to form a duct in which the transmitted wave curves to follow a direct path as if it were enclosed in a huge waveguide.

The average or standard refraction effect of the atmosphere may be taken into account by assuming that the earth has a radius 4/3 times its actual value, and by computing geometrical horizon ranges on this assumption. When this is done the horizon will be at a distance $r$ from a point at height $h$ above a spherical earth given by

$$r = 1.22\sqrt{h}$$

where $h$ is in feet and $r$ is in nautical miles; or by

$$R = \sqrt{2h}$$

where R is in land miles and $h$ in feet.

The radio horizon distance between a point at $h_1$ and another at height $h_2$ is

$$r = 1.22\sqrt{h_1} + 1.22\sqrt{h_2}$$

The importance of antenna elevation for line-of-sight transmissions in this frequency band are emphasized by the square root dependence in the above formula.

(3) RECORDING OF OBSERVED DATA. – In addition to correct operating procedures described elsewhere in this instruction book, it is essential that data records be very complete so that the results of a survey may be properly interpreted and evaluated by interested personnel.

When graphic records are made, each recorder chart must be carefully identified and complete information supplied for each series of measurements. This information should include the date, start and finish time, the test identification, the location (very carefully described as to geographical position and to presence of disturbing objects), description of weather conditions, the equipment used, the measurement frequency, the calibration, the attenuator setting, the function-switch position, the antenna used, the chart speed, erratic conditions, and non-opposite minima. A convenient form for entering data on a recorder chart is as follows:

Date
TEST ..................................................
LOCATION
(use additional space for complete description) ..................................................
Equipment .................................... Ser. # ..........
Freq. Calibration
Atten. Setting .................... Function-sw ..............
Antenna ..........................
Height above ground
Ground ..................................................
Recorder Ser. # .............. Chart speed
Time: start stop
Observers
Notes:

When graphic recording is not employed, the same information should be entered on a form such as that

show in Table 4-2. Some of the data may appear to be superfluous at the time of observation, but it is often invaluable when trying to interpret results at a later date. Ae separate record sheet or graphic record chart should be used for each measurement location.

A sample description of a measurement site is as follows:

Site #9—15.7 miles north of Riverside, California State Route 498 (0.4 miles south of intersection with State Route 37), 450 feet east of highway in open field; grove of trees approx. 50 feet high lies 500 feet northeast of site; nearest wire lines 450 feet east, running north and south; nearest wire fence 300 feet south, running east and west; terrain slightly rolling; check showed uniform field conditions.

In the "Remarks" column of the data sheet, enter all pertinent information such as height of antenna, weather and atmospheric conditions, poor minima, local interference, fluctuations in signal strength, antenna current if known, operational difficulties, and any other data that may be useful.

The observed field intensity may be measured and listed in either microvolts per meter or in decibels above one microvolt per meter. It is sometimes desirable, however, to be able to convert from one to the other. The following formula may be used for this purpose:

FI decibels above 1 microvolt/m(db) $= 20\mathrm{X}\log_{10}\mathrm{FI}$ (microvolt/m).

*b.* RADIO INTERFERENCE CONSIDERATIONS.

(1) SELECTING THE SITE FOR GENERAL INTERFERENCE SURVEYS.—An open flat terrain is preferred to preclude absorption by dense growths of trees and steep ridges. Also, the face of a nearby cliff may act as a reflector and produce local variations in the intensity of interference measured.

In order to isolate the radiated field from the induction field of a source of interference, radio interference measurements of a radiating source should be made at distances greater than twice the wavelengths of the radiated energy.

In general, interference surveys made in the vicinity of power lines are subject to inaccurate results because of possible reradiation from the power lines and it is necessary to measure at considerable distance from the power lines.

Every attempt should be made to avoid locating the equipment near closed loops present in iron-framed buildings and topside structures aboard ship. If possible, avoid locations in the vicinity of underground pipes, trolley cables, or rail lines.

When the equipment is installed in a vehicle, it should be remembered that the metal body and frame of the vehicle tend to distort the pick-up pattern of the dipole antenna. In addition, closed loops formed by vehicle wiring or structural members will affect the field pattern. In some cases, these errors can be determined with the equipment mounted in a designated location. Correction factors so obtained may then be applied to compensate for pick-up pattern distortion.

When a variety of equipment, including radio receivers, is employed at any one site, check for interaction.

Choose at least three sites not in a line for radio interference surveys, since triangulation is used to locate the source of interference.

**Note**

Survey results must be evaluated according to how close actual survey sites approach ideal conditions.

(2) INTERFERENCE SURVEY.—An interference survey of a suspected area should begin with a series of measurements, at the frequencies under investigation, made with appropriate pick-up. Should a station or service be found operating on the frequency selected for measurement, move sufficiently away in frequency to avoid the side bands of the station. The survey report should, however, note the frequency and field intensity of signals from the station.

During the survey the received signals should be aurally monitored at a volume level that will enable identification of the received signal or interference.

Three-point fixes on each source of interference enable the geographic location to be determined by triangulation, using magnetic bearings. The next step is to investigate each interference source in turn, moving the RI-FI Meter close to each source of interference and refining the distant fix previously obtained.

If the interference source is found to be a power line or other current-carrying conductors, substitute the RF probe for the dipole antenna and use the RI-FI Meter as a two-terminal voltmeter to determine the amount of conducted interference on the line.

## WARNING

Standard safety precautions should be taken when connecting to power lines or any equipment which may be energized from a switch not under the control of the operator of Radio Test Set AN/URM-17A. All connections shall be made with the power disconnected from the lines or equipment.

(3) RECORDING OF OBSERVED DATA.—Data form is given in Table 4-2. (See Note 1 of Table). Record on back of data sheet interference-reduction measures taken, if any. Check the effectiveness of interference-reduction measures taken by comparison measurements.

When an interference measurement is made on rotating power equipment, record complete nameplate nomenclature, especially serial numbers, so that information can be correlated with other equipment reports. Note whether measurement made with a power source for the equipment that is properly filtered.

## TABLE 4-2. FIELD INTENSITY DATA RECORD SHEET

Date........................ Transmitting station ........................

Radio Interference
Measuring Set
AN/URM-17A, Ser. #........ Meas. Site ........................

(On back of this sheet, list all pertinent site data.)

Observers ........................

Distance from trans. ........................naut. mi. ........................

Stat. mi. ........................

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | 8 |
|---|---|---|---|---|---|---|---|---|
| Time | Freq | Ind $\mu v$ | Att Set | Corr Fact | Pickup | FI | | Remarks |
| | | | | | | $\mu v/m$ | db | |
| | | | | | | | | |

Notes: (1). Col. 3 is indicated microvolts on the RI-FI Meter.

Col. 4 is attenuator setting of RI-FI Meter.

Col. 5 is correction factor of the RI-FI Meter.

Col. 6 is the type of pickup, loop or dipole antenna.

Col. 7 is the resultant field intensity.

($\mu v/m$- = Col. 3 x Col. 4 x Col. 5

(db) = $20 \times \log_{10} (\mu v/m)$

Col. 8 is for notes on weather conditions, operational difficulties, transmitting antenna current, height of transmitting and receiving antenna, etc.

(2). Be certain to fill in sheet numbers at right hand corner to maintain continuity of data sheets.

Tested by: ........................

## TABLE 4.3. RADIO INTERFERENCE DATA SHEET

Test Location ______________________________ Test Number ____________

Specification ______________________________ Date ____________

Test Sample:

| | | |
|---|---|---|
| TYPE | | OTHER: |
| MFR. | | |
| MODEL | | |
| SERIAL | | |
| FREQ RANGE | | |
| CURRENT | | |
| VOLTAGE | | |
| LINE FREQ. | | |
| POWER | | |

Radio Interference Correction Measures Incorporated in Test Sample.

| |
|---|
| |
| |
| |
| |

Test Equipment:

| | | | | |
|---|---|---|---|---|
| MODEL | | | | |
| FREQ. | | | | |
| SERIAL | | | | |
| CAL. | | | | |
| PICKUP | | | | |
| PICKUP | | | | |
| PICKUP | | | | |

Tested by: ____________________

____________________

Note: Make detailed site description, diagrams, and remarks on reverse side

Sheet One of ____ Sheets

## TABLE 4-4. RADIO INTERFERENCE DATA SHEET

Test Equipment: Model ______________________ Test Number ______________

Serial ______________________

Pickup ______________________ Date ______________

Test Sample: Type ______________________ Model ______________

| BAND | FREQ. IN MC | CORR. FACT. | FI | | QP | | PEAK | | PEAK | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | IND. | CORR. | IND. | CORR. | IND. | CORR. | | |
| | | | | | | | | | | |
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Tested by: ______________________

______________________

Note: Attenuator settings for indicated readings shown by powers of ten

Additional remarks and notes on reverse side.

Sheet _____ of _____ Sheets

# SECTION 5

# OPERATOR'S MAINTENANCE

## 1. INTRODUCTION.

Operator's maintenance procedures are limited to emergency tube change and replacement of line fuses in the RI-FI Meter and power supply units.

## 2. EMERGENCY MAINTENANCE.

**Note**

Operators shall not perform any of the following maintenance procedures without proper authorization.

*a.* TUBE REPLACEMENT. *(See figures 5-1, 5-2, and 5-3.)*—In an emergency the RI-FI Meter and power supply units can be opened in the field for testing and replacing defective tubes. The locations and identification of all tubes are shown in figures 5-1 and 5-2. If available, use a miniature-tube pin-straightener to align the pins of the miniature tube bases. *(See figure 5-3.)*

To open the RI-FI Meter for tube replacement, place the unit face-down on the two front-panel guards. Remove the four rubber feet on the back of the instrument case. Lift the case off the chassis. The miniature tubes in this equipment are held in place by spring-loaded tube shields. To remove a tube, depress and turn the tube shield counterclockwise, then lift. Grasp the tube with two fingers and pull straight out of the socket.

**Note**

In removing the tube shield on V-109, observe the aluminum washer placed between the top of the tube and the tube shield. This washer is required to maintain a fixed capacity between the tube shield and the tube elements. Place the washer over V-109 before putting the tube shield in place. In the event the washer has been lost, obtain a replacement with the following dimensions: 51/64 OD x 0.144 ID x 1/32 in. thick.

Acorn-type tubes used in the RF and calibrator sections have no tube base. They are supported by spring clips and small clamps screwed down tightly on the tube element pins extending radially out of the glass tube envelope. Tighten the clamps evenly to avoid poor connections or cracking the envelope at the tube seal. When replacing tubes tighten the clamp holding the *plate leads first* then the grid lead clamps. In the event V-101 through V-113 are replaced, the equipment alignment and calibration should be checked at the earliest possible moment. *(See section 7, par. 7, 8, 9, and 10.)*

R-F Amplifier V-117 is changed in the following manner:

(1) Turn the power switch to OFF and disconnect the Power Supply from the AC source and from the RI-FI Meter.

(2) Remove the RI-FI Meter chassis from the cabinet.

(3) Remove the cover from the butterfly box, following the instructions for removal as they appear on the cover.

(4) Remove the screw holding the tube plate contact, located at the back of the Mixer butterfly circuit, and remove contact from the tube.

(5) Unscrew the tube grid contact retaining ring from the tube support located on the interstage shielding wall. Use special wrench located on left hand gusset plate for the purpose of loosening or tightening the ring.

(6) Grasp the tube plate-contact gently with long-nose pliers and gently rock the tube from side to side with an outward pulling motion and work the tube out of the cathode-heater contact attached to the R.F. butterfly tuner.

**CAUTION**

Great force is not required to remove or install the tube in the socket assembly. Should the coaxial cathode heater contact tend to pull into the mounting, finger pressure of the free hand is sufficient force to restrain the cathode-heater contact.

(7) Installation of a new tube is accomplished in the reverse manner to that described in steps (1) thru

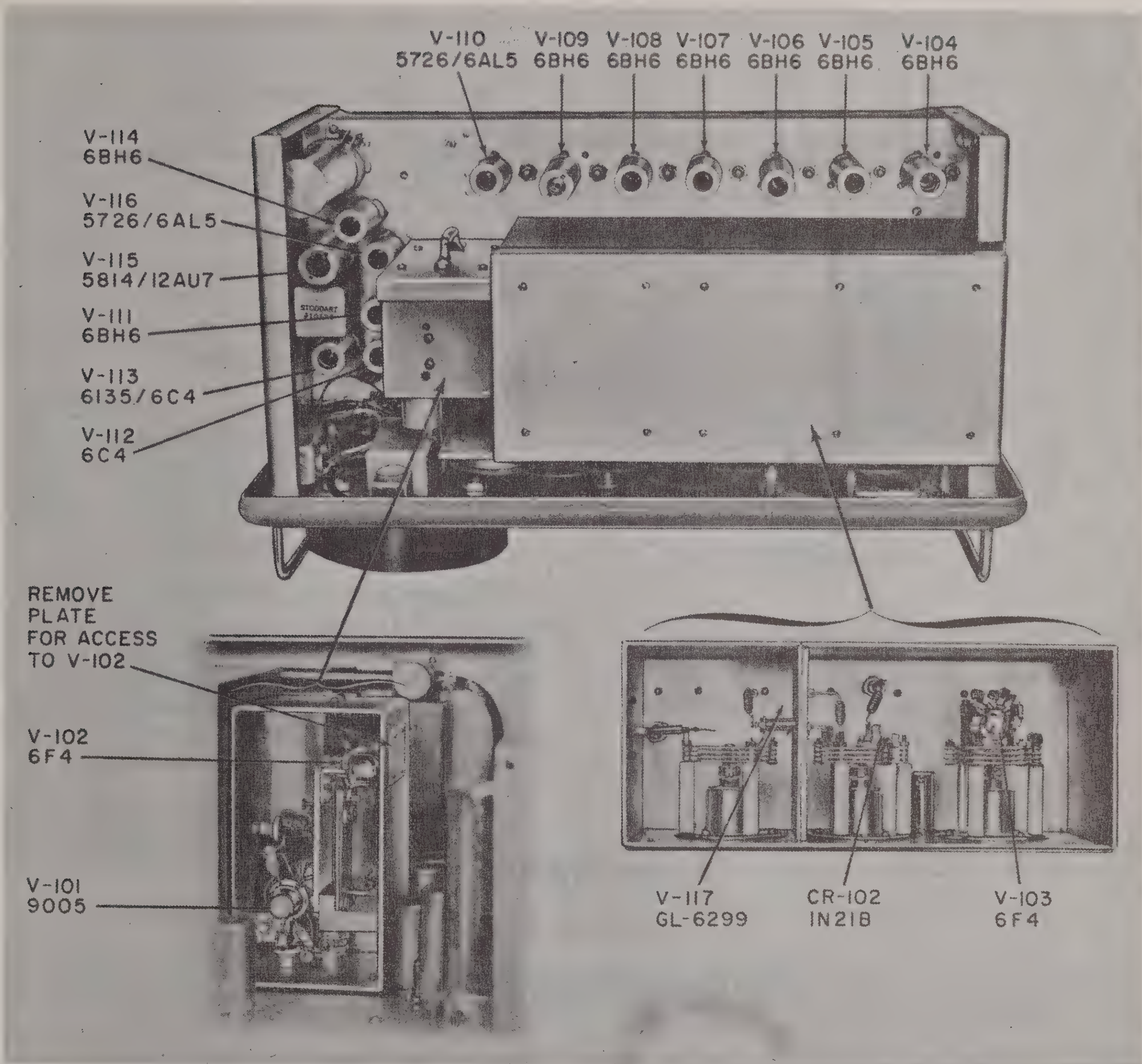



**Figure 5-1. Radio Interference-Field Intensity Meter IM-52A/URM-17, Tube Locations**

(6). Finger pressure should prevent coaxial cathode-heater contact movement while the tube is being installed.

To open Power Supply PP-530A/URM-17, place the unit face-down on the two front-panel guards and remove the ten screws from around the sides of the instrument case. Lift the case off the chassis.

Any of the tubes in the power supply can be replaced without seriously affecting the calibration of the RI-FI Meter. Tube clamps employed in this unit can be operated with the fingers, or by means of a screwdriver inserted in the slot of the clip.

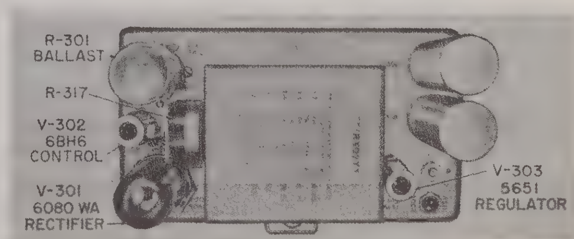



**Figure 5-2. Power Supply PP-530A/URM-17, Tube Locations**

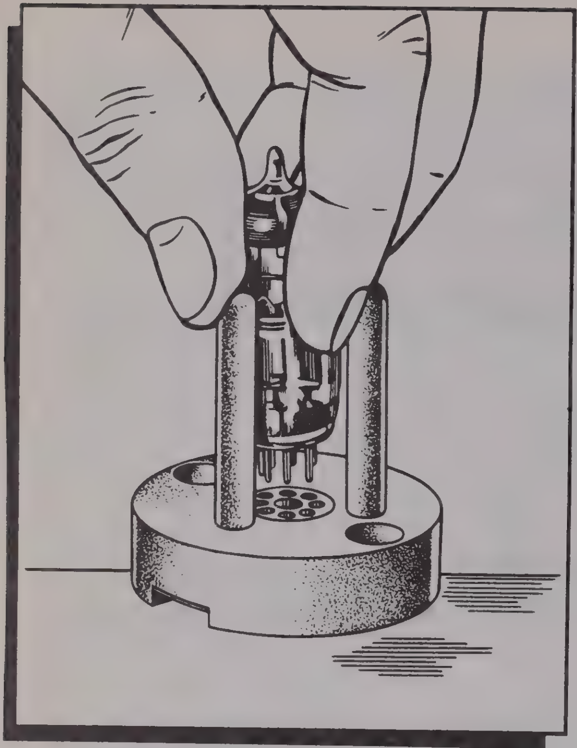


*Figure 5-3. Using the Miniature-Tube Pin-Straightener*

**Note**

Be certain to replace all tube shields and to lock all tube clamps before closing the units.

*b.* FUSE REPLACEMENT.—Either or both of the line fuses may be blown, if the pilot lamp on the Power Supply PP-530A/URM-17 does not light when the POWER switch is put in the ON position. Spare fuses of the proper rating (2 A, 250 V, type 3 AG) are located in the spare fuse holders on the power supply front panel. Replace fuses in the spare fuse holders as soon as possible.

**WARNING**

Never replace a fuse with one of higher rating unless continued operation of the equipment is more important than probable damage. If a fuse burns out immediately after replacement, do not replace it again until the cause has been located and corrected.

*c.* SPARE CRYSTAL DIODES.—Spares for the crystal diode in the mixer circuit are mounted in clips toward the rear of the chassis. *Do not remove the lead foil wrapping* until necessity for replacement of a defective crystal arises. See instructions for replacing the crystal diode CR-102 in section 7, par. 4.

# SECTION 6

# PREVENTIVE MAINTENANCE

## 1. GENERAL.

Approach preventive maintenance procedures on Radio Test Set AN/URM-17A with caution. Opening the RI-FI Meter and Power Supply PP-530A/URM-17 should be kept to a minimum for the following reasons:

(1) There is little likelihood of moisture or dirt accumulating inside the units to result in breakdowns, because the main units are substantially drip-proof.

(2) Components, including electron tubes, used in the equipment under normal conditions of operation have long life.

(3) No parts in the basic equipment require lubrication. Careful handling while setting-up and during operation will prevent most breakdowns likely to occur.

*a.* VOLTAGE CHECK.—Connect Power Supply PP-530A/URM-17 to a 115-volt 60-cycle external power source and measure the voltages appearing at the POWER OUTPUT receptacle J-301 under load conditions. Correct voltages at J-301 are: 6.3 volts AC across terminals A and E, +225 volts DC between terminal B and ground, −17 volts DC between terminal C and ground. (See figure 7-16.)

*b.* SENSITIVITY AND CALIBRATION CHECKS. —These checks are embodied in the operating procedure. The operator must set the gain of the RI-FI Meter for the standard meter reading of 100 microvolts prior to taking a series of measurements on any one frequency. The operator can detect any radical change in sensitivity of the unit because this condition will necessitate a CAL control setting at a point greatly different from that normally used to obtain standard gain.

The operator can also note any radical change in the calibration circuits because faulty calibration circuit operation will necessitate frequent adjustment of the ADJ control.

# SECTION 7

# CORRECTIVE MAINTENANCE

## 1. INTRODUCTION.

The procedures, illustrations, and tables in this section are for the purpose of assisting maintenance personnel in the repair and adjustment of Radio Test Set AN/URM-17A. When the equipment has failed in operation, the source of the trouble must be located, the defect remedied, and the equipment restored to operating condition. The information is, therefore, presented in the following order:

Localization of Trouble (par. 2)
Removal of Chassis from Instrument Cases (par. 3)
Radio Interference-Field Intensity Meter IM-52A/URM-17 Trouble Shooting and Repair (par. 4)
Power Supply PP-530A/URM-17 Trouble Shooting and Repair (par. 5)

Maintenance Procedures (par. 6 through 10).
Illustrations contained in this section include an overall schematic diagram, practical wiring diagrams, voltage and resistance data, and internal views of the equipment with component parts identified by reference symbol number.

The tables included at the end of the section are:

Table 7-1. Electron Tube Operating Voltages
Table 7-2. Winding Data

**Note**

Maintenance personnel must fill out a failure report for each part, component, tube or mechanical assembly repaired or replaced. See sample failure report shown in figure 7-1.

## 2. LOCALIZATION OF TROUBLE.

*a.* INTRODUCTION.—Trouble shooting problems in Radio Test Set AN/URM-17A may be located just

**FAILURE REPORT**

"Report each failure of the equipment, whether caused by a defective part, wear, improper operation, or an external cause. Use ELECTRONIC FAILURE REPORT form DD 787. Each pad of the forms includes full instructions for filling out the forms and forwarding them to the Bureau of Ships. However, the importance of providing complete information cannot be emphasized too much. Be sure that you include the model designation and serial number of the equipment (from the equipment identification plate), the type number and serial number of the major unit (from the major unit identification plate), and the type number and reference designation of the particular defective part (from the technical manual). Describe the cause of the failure completely, continuing on the back of the form if necessary. Do not substitute brevity for clarity. And remember—there are two sides to the failure report—

"YOUR SIDE"

"Every FAILURE REPORT is a boost for you:
1. It shows that you are doing your job.
2. It helps make your job easier.
3. It insures available replacements.
4. It gives you a chance to pass your knowledge to every man on the team.

"BUREAU SIDE"

"The Bureau of Ships uses the information to:
1. Evaluate present equipment.
2. Improve future equipment.
3. Order replacements for stock.
4. Prepare field changes.
5. Publish maintenance data.

"Always keep a supply of failure report forms on board. You can get them from the nearest District Publications and Printing Office."

*Figure 7-1. Failure Report, Instructions*

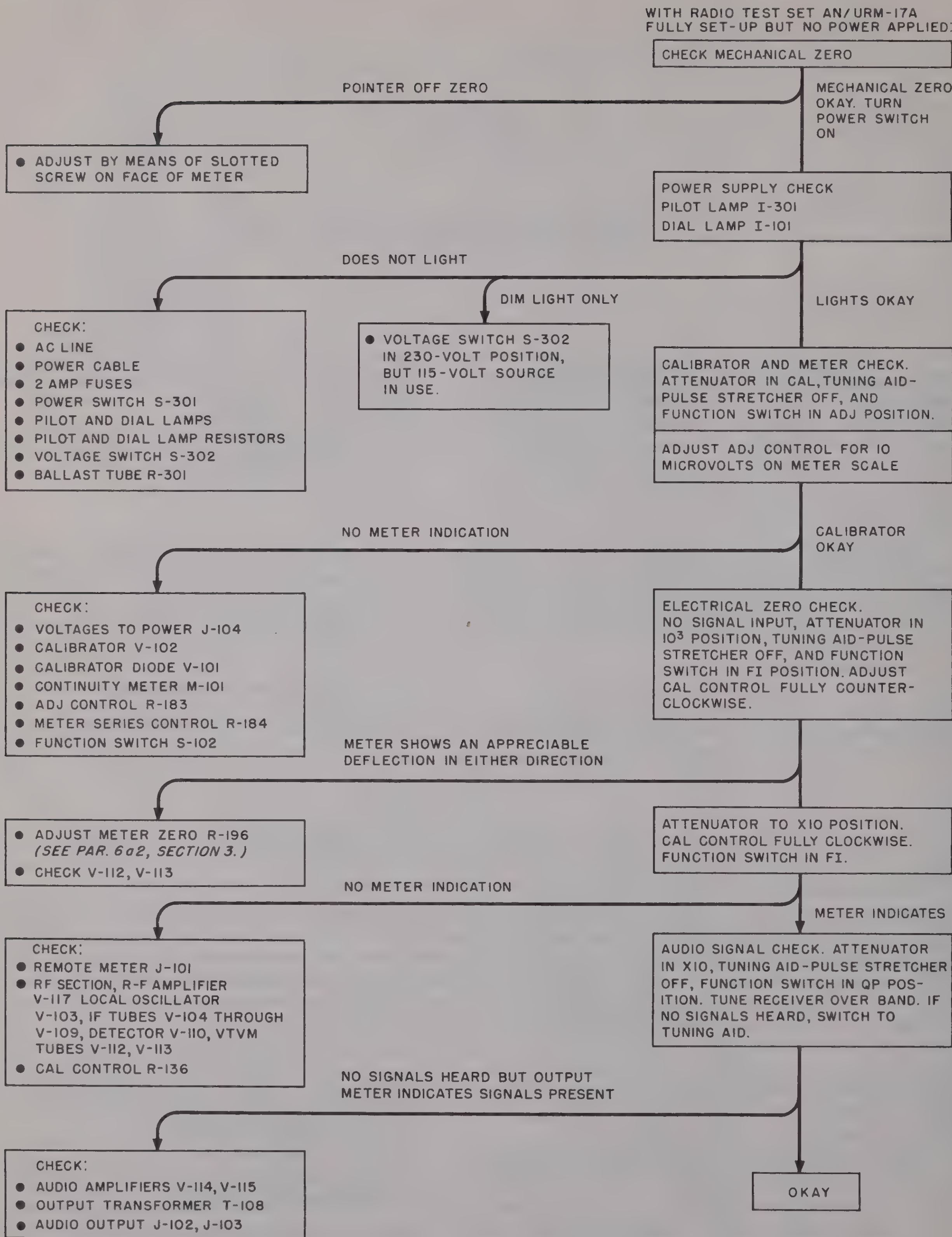



*Figure 7-2. Radio Interference-Field Intensity Meter IM-52A/URM-17, Trouble Shooting Chart*

as troubles are located in communication receivers. Inspect the entire equipment in an attempt to isolate the faulty unit. Check the interconnecting cabling between units. Determine that required power is applied to Power Supply PP-530A/URM-17 and that the operating potential outputs of the power supply are applied to the RI-FI Meter. The power supply pilot light I-301 and RI-FI Meter dial light I-101 serve to indicate power application to the respective units. Determine whether or not an output indication can be obtained on a remote meter. Check that panel operating controls are properly employed as described in Section 4, Operation.

If one of the RF input devices is the source of the trouble, check the continuity of the circuit through the suspected device.

When apparent lack of operating potential output from Power Supply PP-530A/URM-17 is noted, check by making voltage measurements at the output connector.

In the event malfunctioning of the equipment is caused by the RI-FI Meter, continue the elimination procedure with the aim of locating the faulty stage. The RI-FI Meter is similar to a communications receiver, having an RF section, IF section, and AF section. In addition, it has a sine wave calibrator circuit, VTVM circuit, and detector weighting circuits. Consult the trouble shooting chart, figure 7-2, for aid in locating a faulty stage or circuit.

One major source of improper equipment operation is incorrect calibration and alignment control adjustment. Operational tests are given in this section to aid in determining the efficiency of equipment operation. Complete calibration and alignment procedures are also given to aid in bringing the equipment up to highest sensitivity and accurate calibration. *(See par. 6 through 10.)*

*b.* OPERATIONAL TESTS. *(See figure 7-2.)*—When localizing procedures definitely point to a trouble in the Radio Interference-Field Intensity Meter IM-52A/URM-17 the source can be readily traced to any given stage. The calibrator circuit of V-110 constitutes a convenient signal generator for checking receiver operation. To check the calibrator and meter, turn the function switch to the ADJ position (attenuator control to CAL, TUNING AID-PULSE STRETCHER switch to OFF). This connects plate voltage to the calibrating oscillator and also connects the front-panel meter across the calibrating diode. If the calibrator circuit is functioning properly the calibrator output can be adjusted by means of the ADJ control for a meter reading of 10 microvolts. To check the receiver section, turn the attenuator control to CAL and the function switch to the CAL position, (TUNING AID-PULSE STRETCHER switch to OFF). This again connects plate voltage to the calibrating oscillator but it also connects the meter to the VTVM circuit at the detector output. Tune the RI-FI Meter to the calibrating signal frequency, approximately 800 mcs. If the RF, IF, detector, and VTVM sections are functioning properly, the receiver output is applied to the panel meter M-101 and this indication can be adjusted by means of the CAL control in the range of zero to 100 microvolts.

Check the slide back feature by positioning the function switch to PEAK and moving PEAK control R-179 through its range. The resulting panel meter indication should move smoothly up-scale from zero to 100 microvolts.

When the audio stages are the location of trouble, little or no headphone signal will be heard, but the VTVM circuit will be operative.

## 3. REMOVAL OF CHASSIS FROM INSTRUMENT CASE.

Upon determining that the trouble source is in either the RI-FI Meter or Power Supply PP-530A/URM-17, the next step is to remove the suspect chassis from its case and trace the trouble to a faulty component.

To open the RI-FI Meter, stand the unit on the front-panel guards. Remove four rubber feet on the back of the case. Slide the case off the chassis.

To open the power supply, stand the unit on the front-panel guards. Remove ten screws at the sides and slide the case off the chassis. To gain access to the under-chassis components, lay the chassis on one side so that the front panel is accessible. Remove the fourteen screws at the edges of the front panel. Lift the panel away from the chassis, to the extent permitted by the wiring between panel and chassis.

The following procedure must be followed in order to properly seal the RI-FI Meter and power supply cases when replacing the chassis in the cases. Stand the RI-FI Meter on the front-panel guards and slide the case over the chassis. Insert and tighten the four rubber feet at the back of the case. To replace the power supply chassis, stand the power supply on the front-panel guards. Slide the case over the chassis and *start* the ten screws in the sides of the case. Invert the power supply so that the panel is up. *Start* the fourteen screws at the edges of the front panel. Tighten the ten screws at the sides of the case, then tighten the fourteen screws on the front panel.

## 4. RADIO INTERFERENCE-FIELD INTENSITY METER IM-52A/URM-17 TROUBLE SHOOTING AND REPAIR.

*a.* TROUBLE SHOOTING DATA.
SCHEMATIC DIAGRAM.—Figure 7-16.
PRACTICAL WIRING DIAGRAM.—Figure 7-14.
VOLTAGE AND RESISTANCE DATA.—Figure 7-13.
PARTS LOCATIONS.—Figures 7-3 through 7-7.
WINDING DATA.—Table 7-2.

*b.* REPAIR AND ADJUSTMENT DATA.

(1) ACCESS TO COMPONENTS. *(See figures 7-3 through 7-7.)*—All components not contained in shield

cans are shown in figures 7-3 and 7-4.

In accordance with shielding requirements at the high frequencies employed in this equipment, the RF and calibrator sections and the bottom of the IF amplifiers are enclosed in tightly closed compartments. The covers for RF and calibrator compartments are constructed in two layers so that the outer layer slides over the compartment and spring fingers on the inner layer slide inside the compartment. Remove two screws in the red areas on the ends of the cover. Slowly rotate the release cam on *each end* of the box 180 degrees. Carefully lift *both ends* of the cover together.

**CAUTION**

Do not lift one end of the cover if the spring fingers on the opposite side are still engaged. Do not touch or change the position of the RF input loop L-110 in the RF compartment.

Internal views of the three compartments are shown in figures 7-5, 7-6, and 7-7, with all components identified.

After removing two screws at each side of the front panel, two panel stud support screws near the center, 3 attenuator screws, attenuator, tuning, RF and mixer trim knobs, and disconnecting P-101 from J-105, the front panel of the RI-FI Meter can be moved aside for access to the components on the back of the panel and to the gearing associated with the dial and ganged tuning mechanism. (*See figure 7-10.*)

(2) TUBE CHANGE.—In order to avoid any possible upset of alignment and calibration, avoid interchanging tubes and only replace tubes when a sensitivity test indicates this need. Tube locations are shown in figures 7-3 and 7-4. Miniature and acorn tubes are used in this unit. The miniature tubes are held in place by spring-loaded tube shields. To remove a miniature tube, depress and turn the tube shield counterclockwise, then lift. Grasp the tube with two fingers and pull

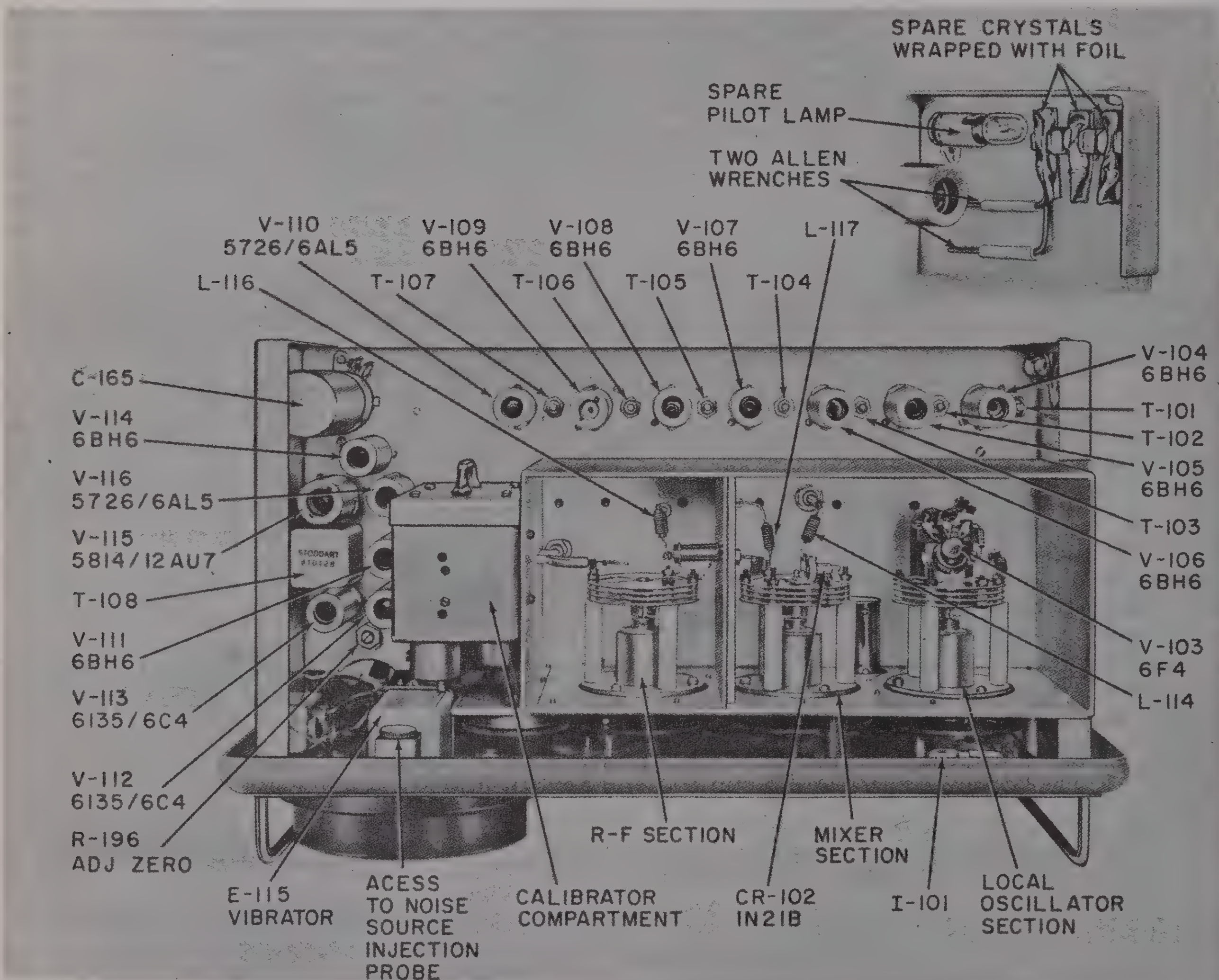



*Figure 7-3. Radio Interference-Field Intensity Meter IM-52A/URM-17, Chassis Top View*

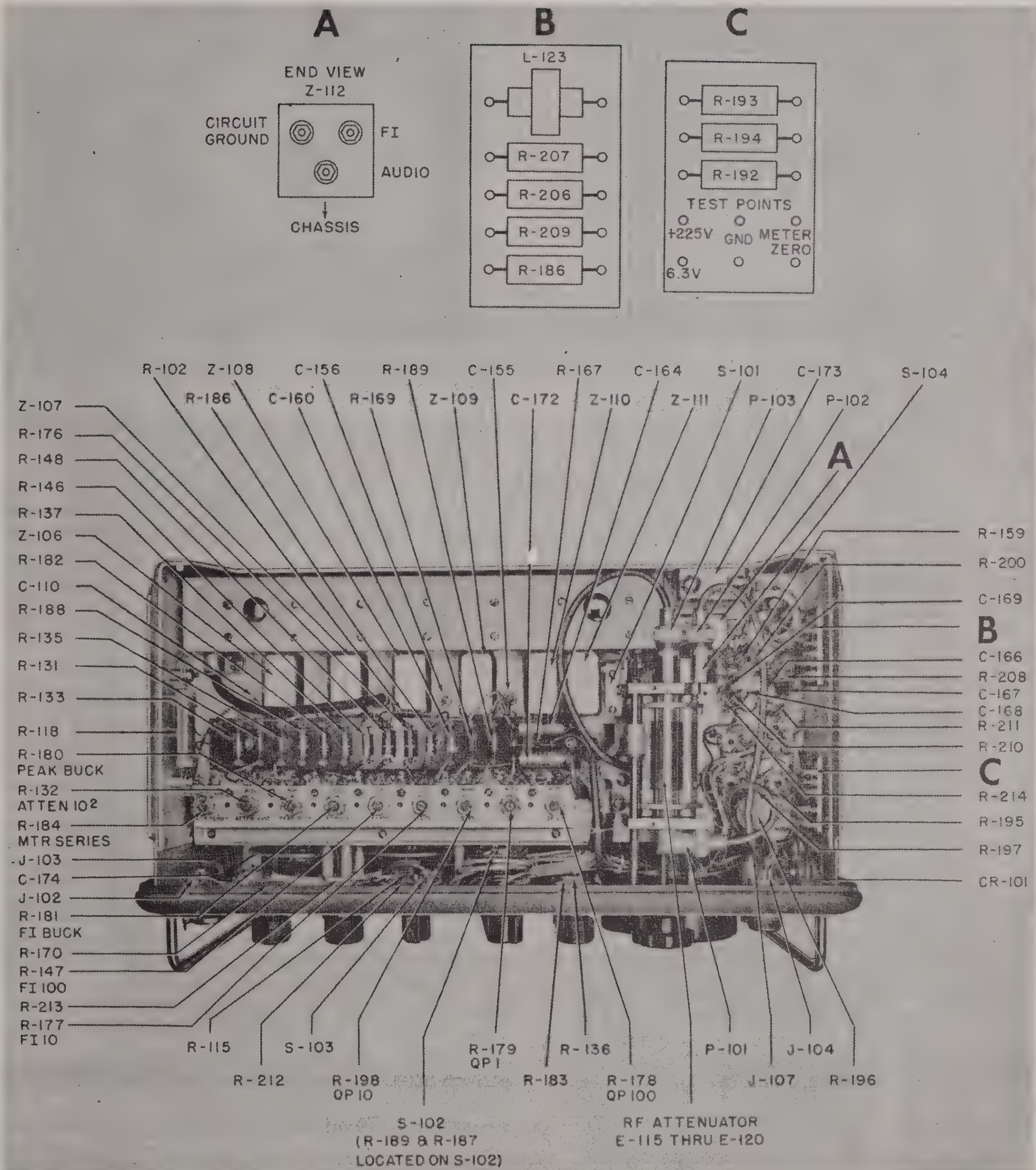



*Figure 7-4. Radio Interference-Field Intensity Meter IM-52A/URM-17, Chassis Bottom View*

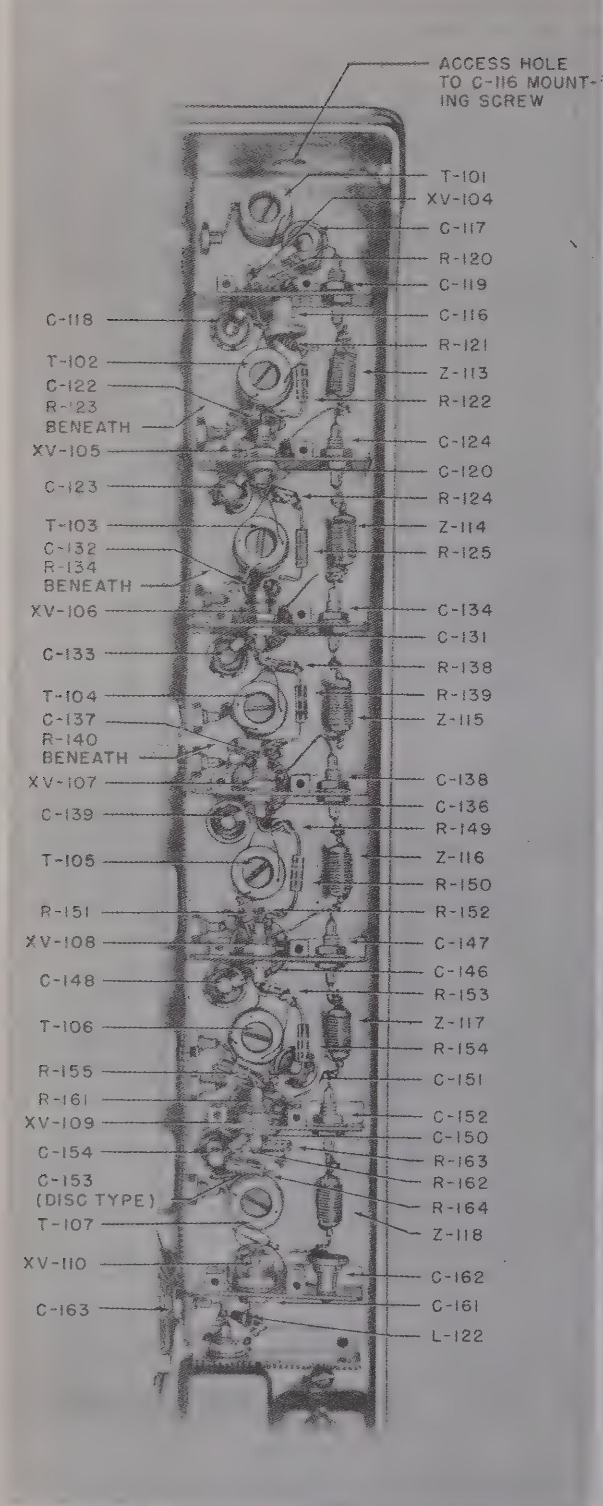



Figure 7-5. Radio Interference-Field Intensity Meter IM-52A/URM-17, Location of Parts in the IF Strip

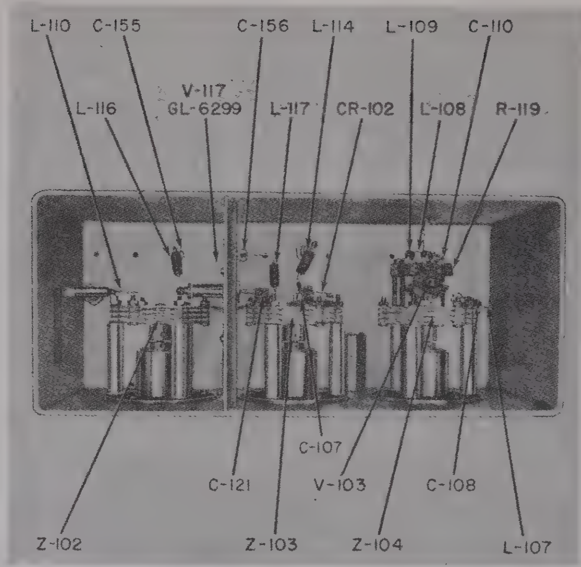


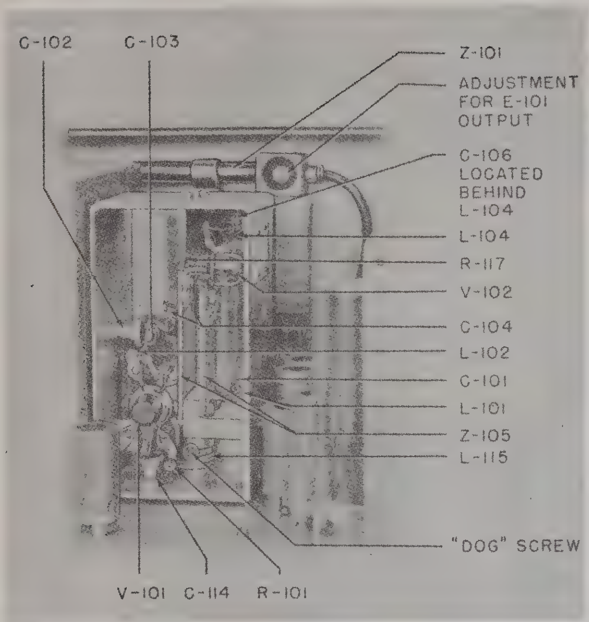

Figure 7-6. Radio Interference-Field Intensity Meter IM-52A/URM-17, Location of Parts

straight out of the socket. Straighten bent tube pins using the special tool shown in figure 5-3 before plugging in any tube.

### Note

In removing the tube shield on V-109, observe the aluminum washer placed between the top of the tube and the tube shield. This washer is required to maintain a fixed capacity between the tube shield and the tube elements. Place the washer over V-109 before putting the tube shield in place. In the event the washer has been lost, obtain a replacement with the following dimensions: 51/64 OD x 0.144 ID x 1/32 in. thick.

A combination of spring clips and clamps fasten each acorn tube in the special mountings provided in the RF and calibrator compartments. To replace an acorn tube, remove the screws that fasten the clamps. Grasp the tube with two fingers and carefully pull the tube straight out of the spring clips. Center the replacement tube over the tube mounting, placing the appropriate tube element leads in the spring clips. Press the tube element leads into the spring clips. Place the clamps over the remaining element leads and start the screws in the clamps. Position the clamps so that they bear down evenly on all tube element leads under the clamps. Tighten the screws of the plate lead clamps first, then those of the grid lead clamps.



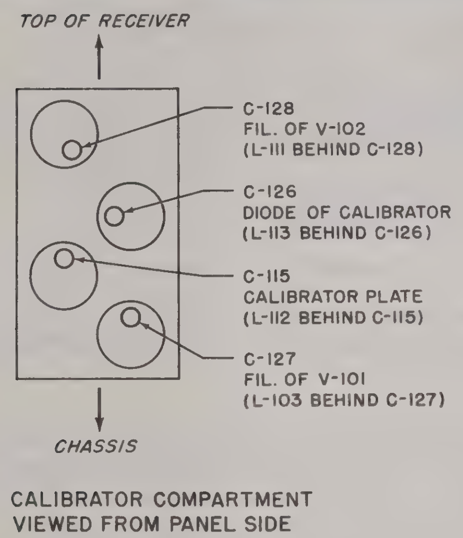




**Figure 7-7. Radio Interference-Field Intensity Meter IM-52A/URM-17, Location of Parts in the Calibrator Compartment**

### Note

To gain access to V-102 in the calibrator compartment, remove the four screws and cover plate over the access hole in the right side of the compartment.

(3) REPLACING THE MIXER CRYSTAL DIODE.—The crystal CR-102 is a 1N21B silicon crystal cartridge mounted in a clip-holder at the rear of the mixer butterfly assembly. *(See figure 7-3.)*

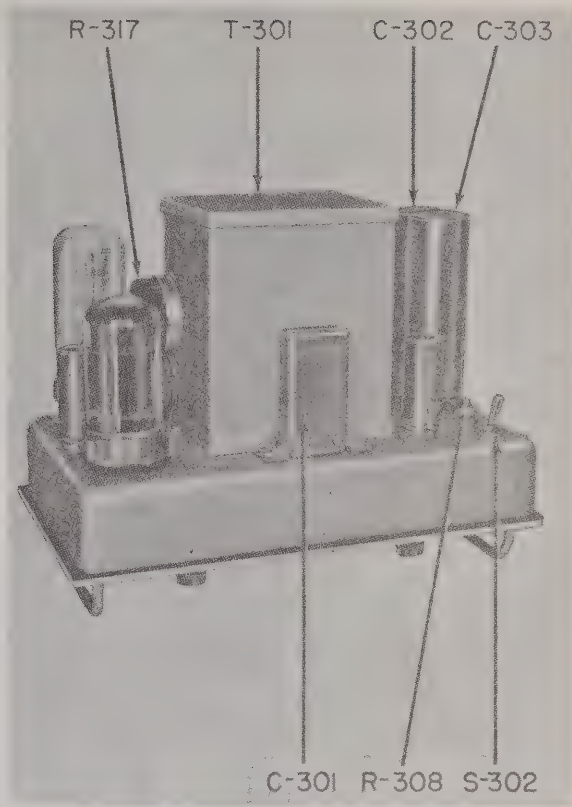



**Figure 7-8. Power Supply PP-530A/URM-17, Chassis Top View**

### CAUTION

Exercise special care when installing a replacement crystal, since they are subject to damage from incident radiation fields and the static discharge from the body of the person handling the crystal. Do not change crystals in the vicinity of transmitters or other sources of high levels of radiation. Do not change crystal when the equipment is energized.

Spare crystals wrapped in metal foil are mounted at the rear of the unit as shown in figure 7-3. Tear the foil away from the end of the cartridge. Grasp the end of the crystal cartridge with two fingers of one hand and avoid touching the other end with the fingers or permitting that end to come in contact with anything. While holding the crystal in this manner, place the heel of the hand in contact with the mixer butterfly to discharge the body static charge. Insert the small end of the crystal into the smaller clip, then press the crystal so that the large end enters the other clip.

(4) REPLACEMENT OF PARTS.—Defective parts should be replaced with correct replacement parts as listed in Section 8. Upon removing the defective part, install the replacement part in the exact position of

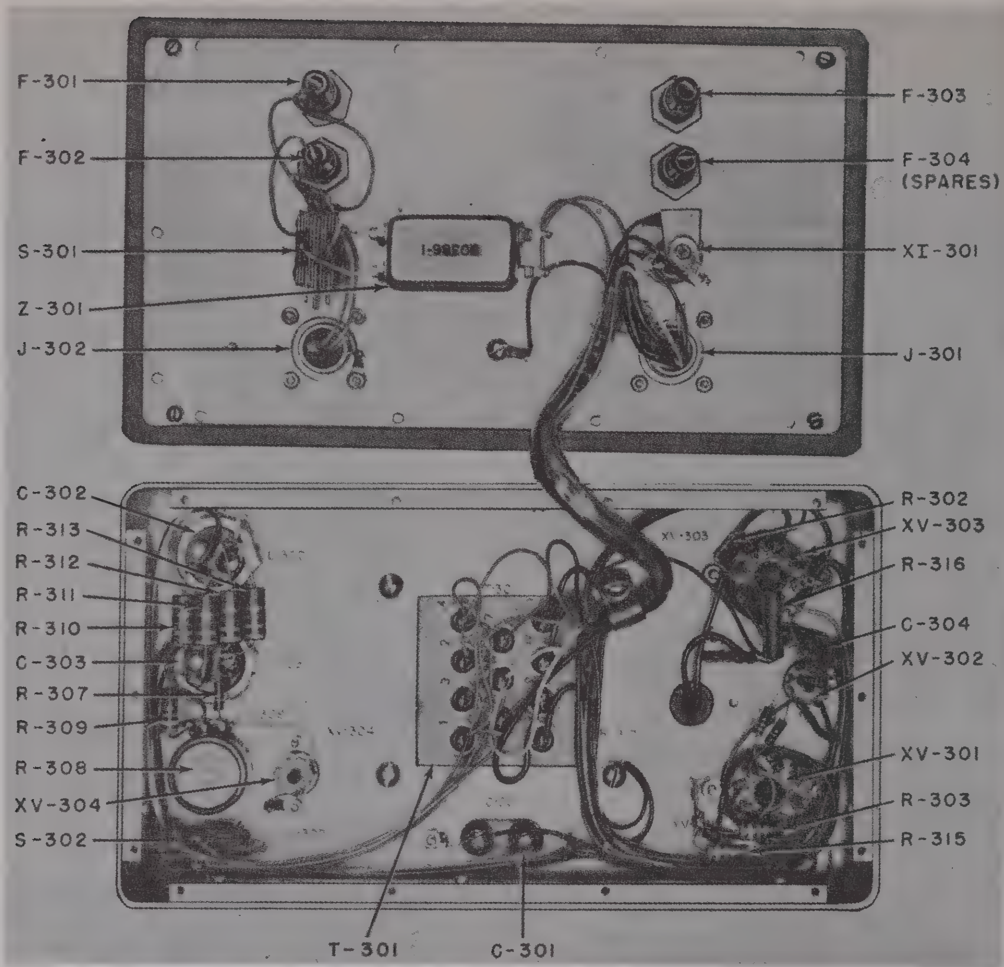



**Figure 7-9. Power Supply PP-530A/URM-17, Chassis Bottom View**

the original part. Keep the leads on the replacement part the exact length as those on the original part.

When coaxial connectors have been disconnected during maintenance procedures, securely tighten the connectors before placing the RI-FI Meter in service. This is extremely important in order to avoid discontinuity at the coaxial connector which adversely affects the standing wave ratio on the coaxial line.

**5. POWER SUPPLY TROUBLE SHOOTING AND REPAIR.**

*a.* TROUBLE SHOOTING DATA.

SCHEMATIC DIAGRAM.—Figure 7-16.

PRACTICAL WIRING DIAGRAM.—Figure 7-15.

VOLTAGE AND RESISTANCE DATA.—Figure 7-13.

PARTS LOCATIONS.—Figures 7-8 and 7-9.

WINDING DATA.—Table 7-2.

*b.* REPAIR AND ADJUSTMENT DATA.

(1) TUBE CHANGE.—Any of the tubes in the power supply can be replaced without affecting the calibration of the RI-FI Meter. Tube locations are shown in figure 7-8.

Tube clamps employed in this unit can be operated with the fingers, or by means of a screwdriver inserted in the slot of the clip.

(2) VOLTAGE ADJUSTMENT. — The required value of B+ output is determined by the setting of the REG ADJ control R-308, which sets the grid bias for the control tube V-302. This adjustment should be made after a warm up period of 30 minutes. If V-302 is replaced, check B+ occasionally until it is stabilized. The power line voltage should be adjusted to 115 volts for this adjustment. Connect the RI-FI Meter to the power supply to provide the proper load conditions. Remove the chassis from the case and open the chassis as described in paragraph 3 of this section. Connect a 20,000-ohm-per-volt voltmeter (AN/PSM-4 series) between the positive terminal of C-303 and ground. Adjust R-308 for a +225-volt reading on the voltmeter.

The required filament voltage output is set by rheostat R-317. Connect an AC Voltmeter across the filament circuit in the IM-52A/URM-17 meter and set R-317 for 6.3 VAC. Recheck and reset to 6.3 VAC after 30 minutes operation with normal set loading.

**Note**

Instructions for the removal and replacement of R-F Amplifier tube V-117 are found in Section 5, paragraph 2.a.

## 6. EQUIPMENT REQUIRED FOR ALIGNMENT AND ADJUSTMENT PROCEDURES.

*a.* RADIO TEST SET AN/URM-17A UNITS.

Radio Interference-Field Intensity Meter IM-52A/URM-17

Power Supply PP-530A/URM-17

Power Cable Assembly CX-3810/U (6′ 6″).

Cable Assembly 91487-1 (10′0″)

R.F. Cable Assembly CG-92D/U (20′ 0″)

Headphone H-132/U

*b.* TEST AND MISCELLLANEOUS EQUIPMENT.

AN/URM-49 Series Signal Generator Equipment or equivalent.

AN/URM-26 Series Signal Generator Equipment or equivalent.

Slotted Line, Hewlett-Packard Model 805A or equivalent.

Standing Wave Indicator, AN/URM-37 series or equivalent.

Signal Generator TS-497/URR or Measurements Model 80 VHF Signal Generator.

Coaxial cable patch cord comprising RG-8/U cable with a connector type UG-21/U Series on each end.

One connector type UG-58A/U.

One 10 mmfd 200-volt capacitor.

Screwdriver for adjustment of potentiometers.

Nut driver (3/16-inch) for adjustment of IF coils.

## 7. SET-UP OF EQUIPMENT FOR ALIGNMENT AND ADJUSTMENT PROCEDURES.

**Note**

Before commencing alignment and adjustment of this equipment, check the mechanical zero setting of the front panel meter. It is possible that correcting this zero setting will correct the symptoms of misalignment or maladjustment and the equipment can be returned to service.

Step 1. Remove the RI-FI Meter from its case and set up on a bench.

Step 2. Inter-connect the RI-FI Meter and Power Supply PP-530A/URM-17 by means of the cable 91487-1 (10′0″). Turn POWER switch S-301 OFF.

Step 3. Connect Power Supply PP-530A/URM-17 to a source of 115-volt alternating current, preferably 60 cycles, by means of Power Cable Assembly CX-3810/U (6′ 6″). Ground the clip at the input end of this cable.

## 8. PRELIMINARY CHECKS PRIOR TO ACTUAL ALIGNMENT.

Operate Power Supply PP-530A/URM-17 POWER switch S-301 to ON. Check voltages at the following points on terminal board under chassis *(see figure 7-4):*

*a.* B+ terminal— +225 volts.

*b.* 6.3 volts terminal— 6.3 volts AC. Also available between chassis and pin 3 of any of the 7-pin miniature tube sockets.

*c.* Bias Supply Voltage— −17 volts DC negative to chassis, available at R-192 on the terminal board.

## 9. ALIGNMENT AND ADJUSTMENT PROCEDURES.

**Note**

Allow a one-hour warm-up period before beginning alignment and adjustment procedures. The locations of screwdriver and nut driver controls referred to in the following procedures are shown in figures 7-3 and 7-4. Various mechanical adjustments referred to here are located on figures 7-6, 7-7, 7-10, and 7-11.

*a.* PRELIMINARY METER TRACKING ADJUSTMENTS.

(1) ADJUSTMENT OF ELECTRICAL ZERO.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | X10 |
| Function (S-102) | FI |
| Tuning Dial Frequency | Any |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |

Step 2. Short out input of VTVM circuit by placing a jumper between two terminal board terminals marked METER ZERO. *(See figure 7-4.)*

Step 3. Zero the indicating meter M-101 by ADJ ZERO control R-196 *(see figure 7-3)* located on top of the chassis directly behind the indicating meter.

Step 4. Take V-107 and V-111 out of their sockets. Remove the jumper across the METER ZERO terminals and observe that the output meter indication remains at zero. Should the meter indication go negative, gas current is present in V-112. Replace V-112 with a tube that does not exhibit this characteristic. After the meter zero is adjusted and a satisfactory V-112 is installed, place V-107 and V-111 in their sockets and tighten the lock nut on R-196.

(2) PRELIMINARY ADJUSTMENT OF THE FI 100 CONTROL.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | X10 |
| Function (S-102) | FI |
| Tuning Dial Frequency | Any |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |

Step 2. Using a 20,000-ohm-per-volt meter, connect the negative lead to the chassis (ground) and the positive lead to the arm of the FI 10 control R-177. *(See figure 7-4.)* Select a voltmeter range to conveniently measure 95 volts DC, and adjust R-177 for a voltmeter indication of 95 volts. Then place the positive lead to the arm of the FI 100 control. Select a voltmeter range to conveniently measure 20 volts DC, and adjust R-147 for a voltmeter indication of 20 volts.

(3) PRELIMINARY ADJUSTMENT OF DIODE BUCKING VOLTAGE CONTROL.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | $X10^2$ |
| Function (S-102) | FI |
| Tuning Dial Frequency | Any |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |
| CAL control (R-136) | Fully counterclockwise |

Step 2. Adjust FI BUCK control R-181 *(see figure 7-4)* to provide approximately 1% (1/16″) deflection of M-101. If R-181 has no control, proceed to paragraph *9a*(4), Alignment of $10^2$ Attenuator Control.

(4) PRELIMINARY ALIGNMENT OF $10^2$ ATTENUATOR CONTROL.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | $X10^2$ |
| Function (S-102) | FI |
| Tuning Dial Frequency | Any |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |
| CAL Control (R-136) | Maximum clockwise |

Step 2. Using a 20,000-ohm-per-volt meter, connect the negative lead to the chassis (ground) and the positive lead to the arm of the ATTEN $10^2$ control R-132. *(See figure 7-4.)* Select a voltmeter range to conveniently measure 5.5 volts DC and adjust R-132 for a voltmeter indication of 5.5 volts.

*b.* INTERMEDIATE FREQUENCY ALIGNMENT.

(1) SET-UP OF EQUIPMENT FOR IF ALIGNMENT.

Step 1. Remove the cover from the RF section.

Step 2. Temporarily turn off power to the RI-FI Meter. Remove the 1N21B crystal from the clip mounting at the rear of the mixer butterfly assembly.

**CAUTION**

The equipment must be de-energized when the crystal is removed from or installed in the crystal holder.

Step 3. Clip one lead of a 10-mmfd capacitor, short enough to allow a close connection, to the crystal holder side of L-114. *(See figure 7-6.)* Wrap two turns of this capacitor lead around the choke lead and carefully crimp the connection using long-nose pliers. Cut off excess capacitor lead. Connect the other end of the capacitor to the center pin of a Type UG-58/U connector.

Step 4. Clamp the body of the UG-58/U connector to the wall of the RF compartment using an alligator-type clip. This grounds the body of the connector and minimizes external signal pickup.

Step 5. Connect coaxial cable patch cord between the UG-58/U connector and the output of Signal Generator AN/URM-26.

Step 6. Plug headphones into either of the two RI-FI Meter AUDIO OUTPUT receptacles.

(2) ALIGNMENT OF IF TRANSFORMERS.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | X10 |
| Function (S-102) | FI |
| Tuning Dial Frequency | Any |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |
| CAL Control (R-136) | As called for |

Step 2. Adjust Signal Generator AN/URM-26 to exactly 60 megacycles. Adjust output of signal generator to provide a convenient mid-scale indication on meter M-101 on the RI-FI Meter. Adjust CAL control in this and following steps so output from signal generator never falls below 20 microvolts.

Step 3. Using 3/16 inch nut wrench, adjust IF transformers T-101 through T-107 *(see figure 7-3)* for maximum indication on output meter, M-101. Since T-101 is loaded by the signal generator, this transformer adjustment need only be approximate at this time.

*c.* FINAL METER TRACKING ADJUSTMENTS.

(1) SET-UP OF EQUIPMENT FOR METER TRACKING ADJUSTMENTS. — Use the set-up described in IF alignment, paragraph 9*b*(1).

(2) FINAL ADJUSTMENT OF THE FI 100, FI 10, AND FI BUCK CONTROLS.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | As called for |
| Function (S-102) | FI |
| Tuning Dial Frequency | Any |

TUNING AID-PULSE STRETCHER (S-103) ........ OFF
CAL Control (R-136) ........ As called for

Step 2. Set the attenuator to X10 position. Temporarily disconnect the 10-mmfd capacitor from IF cable and adjust CAL control R-136 to provide a reading on M-101 of ½ microvolt, arising from internal noise in the receiver. Connect the IF cable to the 10-mmfd capacitor.

Step 3. Set attenuator to $X10^2$ position. This change in attenuator setting should be accompanied by a large decrease in meter indication.

Step 4. Adjust the signal generator to supply an unmodulated 60-megacycle signal and adjust its output to provide an indication of one microvolt on M-101.

Step 5. Adjust signal generator output to 100 times output in Step 4. Adjust FI 100 control R-147 to provide an indication of 100 on M-101.

Step 6. Adjust signal generator output to 10 times output in Step 4. Adjust FI 10 control R-177 to provide an indication of 10 on M-101.

Step 7. Temporarily disconnect signal generator output. Adjust CAL control full counterclockwise. Adjust FI BUCK control R-181 to provide approximately 1% (1/16") deflection of M-101.

Step 8. Repeat Steps 2, 3, 4, 5, 6 and 7 as required to obtain exact meter tracking.

Step 9. Tighten lock nuts on R-147, R-177, and R-181.

(3) FINAL ADJUSTMENT OF THE QP 100, QP 10, AND QP 1 CONTROLS.

Step 1. SET-UP OF OPERATING CONTROLS:

Attenuator ........ As called for
Function (S-102) ........ As called for
Tuning Dial Frequency ........ Any
TUNING AID-PULSE STRETCHER (S-103) ........ OFF
CAL Control (R-136) ........ As called for

Step 2. Set the attenuator to X10 position. Temporarily disconnect the 10-mmfd capacitor from IF cable and adjust CAL control R-136 to provide a reading of ½ microvolt on M-101, arising from internal noise in the receiver. Connect the IF cable to the 10-mmfd capacitor.

Step 3. Set function switch to FI position. Set the signal generator to supply an unmodulated 60-megacycle signal and adjust its output to provide an indication of 100 microvolts on M-101.

Step 4. Set function switch to QP position. Adjust QP 100 control R-178 to provide an indication of 100 on M-101.

Step 5. Set function switch to FI position. Adjust output of signal generator to provide an indication of 1 microvolt on M-101.

Step 6. Set function switch to QP position. Adjust QP 1 control R-179 to provide an indication of 1 on M-101.

Step 7. Set function switch to FI position. Adjust output of signal generator to provide an indication of 10 microvolts on M-101.

Step 8. Set function switch to QP position. Adjust QP 10 control R-198 to provide an indication of 10 on M-101.

Step 9. Repeat Steps 3, 4, 5, 6, 7 and 8 as required to obtain exact meter tracking.

Step 10. Tighten lock nuts on R-178, R-179, and R-198.

(4) FINAL ADJUSTMENT OF THE PEAK BUCK CONTROL.

Step 1. SET-UP OF OPERATING CONTROLS:

Attenuator ........ As called for
Function (S-102) ........ As called for

Tuning Dial Frequency ........ Any
TUNING AID-PULSE STRETCHER (S-103) ........ OFF
CAL Control (R-136) ........ As called for
AUDIO Control (R-213) ........ Fully clockwise

Step 2. Set the attenuator to X10 position. Temporarily disconnect the 10-mmfd capacitor from IF cable and adjust CAL control R-136 to provide a reading of ½ microvolt on M-101, arising from internal noise in the receiver. Connect the IF cable to the 10-mmfd capacitor.

Step 3. Set function switch to QP. Set signal generator to provide a 30% modulated (1000 cycles) 60-megacycle signal and adjust the signal generator output to provide an indication of 1 microvolt on M-101.

Step 4. Set function switch to PEAK. Using earphones, adjust PEAK control R-170 to position where the 1000-cycle audible signal just disappears.

Step 5. Note indication on M-101. If other than 1 microvolt, adjust PEAK BUCK control R-180 for 1-microvolt reading. Repeat Steps 3 and 4 until a meter reading of 1 microvolt is obtained at the threshold of the audible signal.

Step 6. Tighten lock nut on R-180

(5) FINAL ADJUSTMENT OF ATTENUATOR $X10^2$ CONTROL.

Step 1. SET-UP OF OPERATING CONTROLS:

Attenuator ........ As called for
Function (S-102) ........ FI
Tuning Dial Frequency ........ Any
TUNING AID-PULSE STRETCHER (S-103) ........ OFF
CAL Control (R-136) ........ As called for

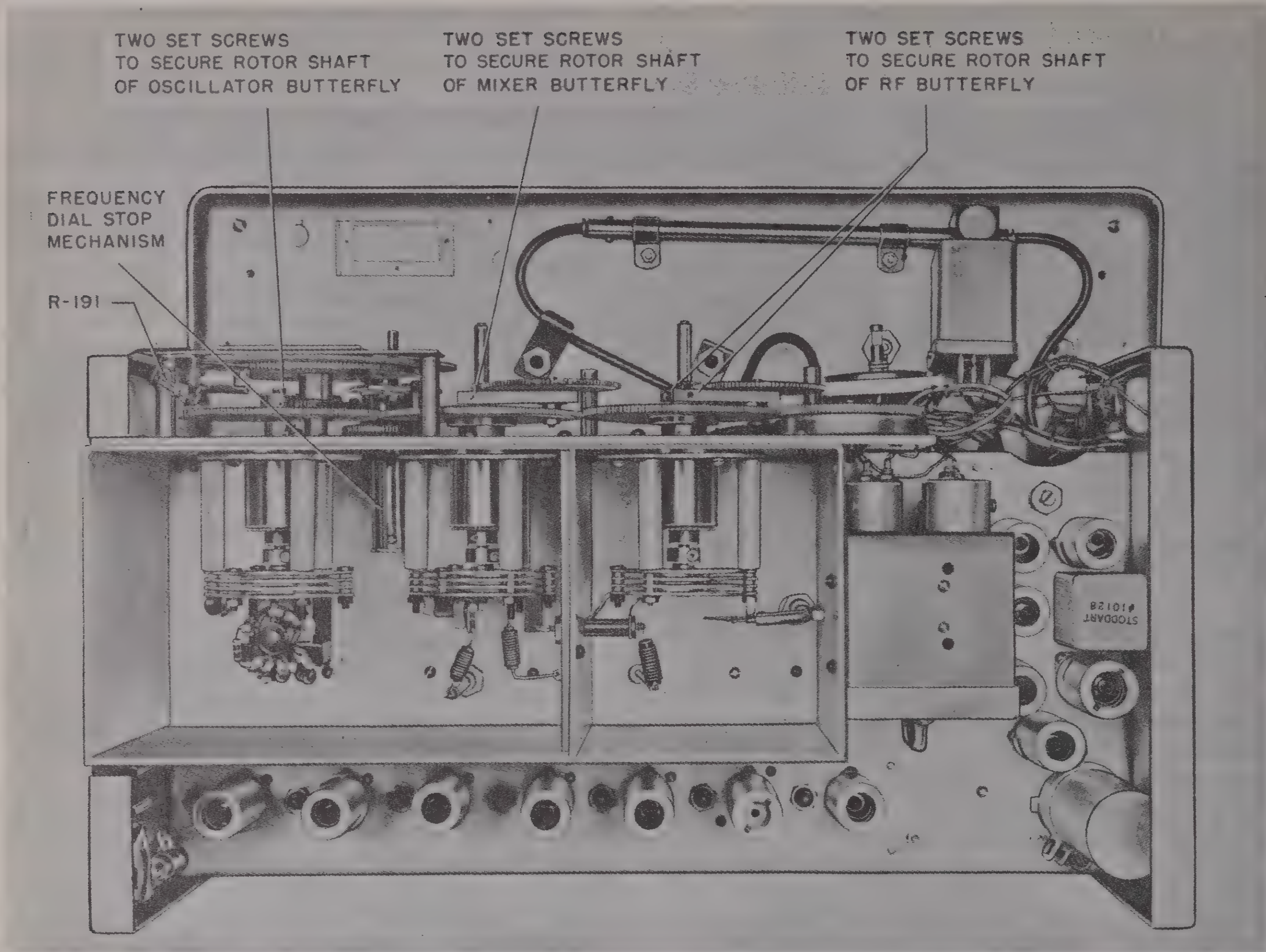



***Figure 7-10. Radio Interference-Field Intensity Meter IM-52A/URM-17, Front Panel Removed for Access to RF Alignment Adjustments***

Step 2. Set the attenuator to X10 position. Temporarily disconnect the 10-mmfd capacitor from IF cable and adjust CAL control R-136 to provide a reading of ½ microvolt on M-101, arising from internal noise in the receiver. Connect the IF cable to the 10-mmfd capacitor.

Step 3. Set attenuator to X10. Set signal generator to supply unmodulated 60-megacycle signal and adjust signal generator output to provide an indication of 100 on M-101.

Step 4. Set attenuator to $X10^2$. Adjust ATTEN $X10^2$ control R-132 for an indication of 10 microvolts on M-101.

Step 5. Tighten lock nut on R-132. Remove IF cable, 10-mmfd capacitor, and UG-58/U connector.

Step 6. Disconnect power to the RI-FI Meter and insert 1N21B crystal in holder at rear of mixer butterfly assembly. Follow instructions for replacing crystal in paragraph 4*b*(3) of this section.

*d.* RADIO FREQUENCY ALIGNMENT.

(1) SET-UP OF EQUIPMENT FOR R.F. ALIGNMENT.

Step 1. Any temporary apparatus used for previous alignment procedures must be removed and the crystal CR-102 must be in place.

Step 2. Connect R.F. Cable Assembly CG-92D U (20′ 0″) to RF INPUT J-107 and to Signal Generators AN/URM-49 or AN/URM-26, as called for during the alignment procedure.

(2) PRELIMINARY BUTTERFLY TRACKING ALIGNMENT.—*(See figures 7-6 and 7-10.)*

Step 1. Check spacing between coil and butterfly assembly as follows:

(a) Spacing of L-110 from the RF butterfly should be approximately ¼ inch.

**CAUTION**

Final adjustment of this coil is critical. Do not disturb the original setting unless it has been accidently changed.

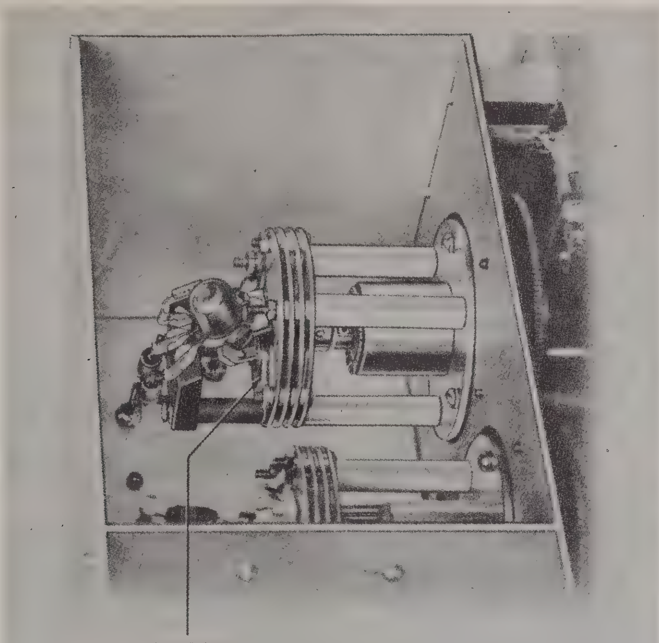



**Figure 7-11. Radio Interference-Field Intensity Meter IM-52A/URM-17, View of the Local Oscillator Stage**

Step 2. Set the tuning knob for a frequency dial reading of 370 megacycles. Compare the position of butterfly rotor plates with following correct positions:

(a) Local oscillator butterfly rotor approximately 90% of fully meshed position with stator plates.

(b) Mixer butterfly rotor approximately 100% of fully meshed position with stator plates, at center of MIXER TRIM cam action.

(c) RF butterfly rotor approximately 100% of fully meshed position with stator plates, at center of RF TRIM cam action.

Step 3. If the above conditions are not met, loosen set screws which secure rotor plate shafts to the main gear hubs on the gear panel and rotate rotors to the proper position. Tighten set screws.

Step 4. Check that butterfly rotor plates are centered between the stator plates.

(3) FINAL BUTTERFLY TRACKING. *(See figure 7-10.)*

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | X10 |
| Function (S-102) | FI |
| Tuning Dial Frequency | As called for |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |
| CAL Control (R-136) | As called for |

Step 2. Adjust CAL control R-136 to provide a reading of one microvolt at M-101, without an external signal.

Step 3. Set the AN/URM-49 Signal Generator to supply a 600-megacycle unmodulated signal to RF INPUT J-107. Adjust signal generator for maximum output. Tune in signal with RI-FI Meter by adjusting TUNING knob for frequency dial setting in the vicinity of 600 megacycles. When signal is found, reduce signal generator output and tune RI-FI Meter for sharp maximum meter reading. Note frequency dial setting. If it is as low as 480 megacycles, the RI-FI Meter is tuned to the image frequency. Tune for a signal at a higher frequency. If frequency dial does not read exactly 600 megacycles, loosen set screws securing oscillator rotor shaft to main gear hub. Rotate rotor in the appropriate direction. Tighten set screws.

Step 4. After local oscillator is in agreement with dial frequency at 600 megacycles, tune RF TRIM and MIXER TRIM controls for maximum signal and maximum meter reading.

Step 5. Trimming is accomplished by a cam and gear train which independently rotates the associated rotor through 6 mechanical degrees with respect to the main tuning gear train. Optimum trimmer alignment exists when butterfly resonance with the signal occurs at the exact center of trimmer control. Since seven complete turns of the trimmer knob equals one complete cycle of cam action (6 degrees one way and 6 degrees back), there should be two maximum signal response points in 7 turns of the knob. These two points should be 3½ turns apart. Trimmer adjustment is required when only one maximum response point occurs, an indication that butterfly rotor is not passing through resonance; also when two unequally spaced response points occur. Loosen two set screws securing rotor shaft to trimmer mechanism and rotate trimmer in the appropriate direction for proper alignment. *(See figure 7-10.)* Tighten set screws. This must be done for both RF and mixer butterfly circuits. Optimum frequency for adjusting trimmers is 800 mcs.

Step 6. Set AN/URM-26 Signal Generator to 370 megacycles. Tun RI-FI Meter to this signal. Resulting frequency dial indication should be within 2 per cent of correct frequency. If not, check spacing between rotor and stator plates of local oscillator butterfly.

Step 7. Set AN/URM-49 Signal Generator to 1000 megacycles. Tune RI-FI Meter to this signal. If frequency dial indication is other than 1000 megacycles, change local oscillator frequency by adjusting grid capacitor C-109 which is a metal plate that forms an air dielectric capacitance to the stator of the local oscillator butterfly Z-104. *(See figure 7-11.)* This adjustment is made by bending the capacitor plate, by hand or with an insulated screwdriver, in a direction toward or away from the stator of Z-104.

Step 8. If much adjustment was required for Step 7, check tracking again at 600 megacycles.

(4) ADJUSTMENT OF IF AMPLIFIER INPUT TRANSFORMER T-101.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | X10 |
| Function (S-102) | FI |
| Tuning Dial Frequency | As called for |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |
| CAL Control (R-136) | As called for |

Step 2. With no external signal to RF INPUT J-107, adjust CAL control for an indicating meter reading of one microvolt on internal receiver noise.

Step 3. Connect AN/URM-26 signal generator to the RF INPUT J-107 and set the signal generator to a frequency of 400 megacycles. Tune in the signal generator signal and adjust the signal generator output to provide a mid-scale indicating meter indication.

Step 4. Using a nut wrench, adjust the IF input transformer T-101 for maximum reading on the meter M-101.

*e.* CALIBRATION ALIGNMENT.

(1) CALIBRATOR OSCILLATOR FREQUENCY ADJUSTMENT.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | CAL |
| Function (S-102) | CAL |
| Tuning Dial Frequency | As called for |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |
| CAL Control (R-136) | As called for |
| ADJ Control (R-183) | Fully clockwise |

Step 2. With no equipment connected to RF INPUT J-107, adjust CAL control for an M-101 meter reading of one microvolt on internal receiver noise.

Step 3. With above set-up of operating controls, the calibrating oscillator should be injecting an 800-megacycle signal into the input circuit to the RF section. Tune in this signal and note the frequency dial reading. It should read approximately 820 megacycles. Capacitor C-104 *(see figure 7-7)* is used to change the resonant frequency over a limited range.

**CAUTION**

If C-104 variable plate is adjusted too close to Z-105 plate line, oscillation becomes unstable or stops entirely. In this event, tune calibrator to some convenient higher frequency.

(2) CALIBRATOR SIGNAL OUTPUT LEVEL ADJUSTMENT.

**Note**

Be certain to cover the calibrator compartment while making output level measurements.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | CAL |
| Function (S-102) | As called for |
| Tuning Dial Frequency | As called for |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |
| CAL Control (R-136) | As called for |
| ADJ Control (R-183) | As called for |

Step 2. Set ADJ control R-183 midway in its range.

Step 3. Set function switch to CAL position. Tune in calibrator signal (800 megacycles) and adjust RF TRIM and MIXER TRIM controls for maximum indication on M-101. Adjust CAL control as required to keep meter from reading off scale.

Step 4. Set function switch to FI.

Step 5. Adjust CAL control to provide a meter reading of exactly two db on internal receiver noise.

Step 6. Set function switch to CAL. Retune RF TRIM and MIXER TRIM for maximum meter indication and calibrator signal. If the calibrator output is properly adjusted the meter reading will be approximately 100 microvolts. Small variation of calibrator output can be accomplished using the ADJ control R-183. Because this control also affects the oscillator frequency, peak up the RF tuning. When a large change in calibrator output is required, proceed with Step 7.

Step 7. Adjustment of calibrator output is accomplished by varying the position of the window opening over the pick-up probe L-115 in a cut and try fashion. Some description of the assembly containing L-115 is required here. The assembly comprises two concentric tubes or barrels and a metal cap with a semicircular aperture at the top. The outer barrel is the fixed member and the inner barrel, containing the Loop L-115 and the 50 ohm series resistor is held in place by an Allen set-screw which is threaded through the wall of the outer barrel. The outer position of the screw passes through a horizontal slot in the metal cap and a nut on the screw locks the cap so that it cannot turn. The position of the aperture is changed by the turning of the cap.

To make the adjustment, uncover the calibrator compartment. *(See figure 7-7.)* Insert an allen wrench in the dog-screw to keep the dog-screw from turning. Slip a wrench over the nut and loosen the nut. Turn the metal cap slightly and tighten the nut. Cover the calibrator compartment and check for 100-microvolt meter reading. Repeat this procedure until the meter reading is gradually brought to 100 microvolts.

**CAUTION**

Loosen the nut only. Do not unscrew the set screw or the inner barrel, containing the output coupling L-115 will be free to move. If the set screw is inadvertently loosened, push the inner barrel into the outer barrel from the attenuator side of the chassis and rotate so the attached cable is parallel to the front panel before tightening the screw.

Step 8. Having brought the calibrator output to a level close to the required meter reading, make final adjustment to the 100-microvolt reading by means of ADJ control R-183. Retune the RF section after each adjustment because the ADJ control affects the frequency of the calibrator output signal.

Step. 9. Set function switch to ADJ position. Adjust MTR SERIES control R-184 for a meter reading of 10 microvolts. If the range of the control is not sufficient to produce the 10-microvolt meter reading, repeat Steps 6 and 7 to obtain a different final setting for ADJ control R-183 (turn R-183 clockwise for an increase and counterclockwise for a decrease in indicating meter indication).

Step 10. Tighten lock nut on MTR SERIES control R-184.

*f.* TUNING AID ALIGNMENT.

(1) ADJUSTMENT OF TUNING AID OUTPUT SIGNAL LEVEL.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | As called for |
| Function (S-102) | As called for |
| Tuning Dial Frequency | 800 megacycles |
| TUNING AID-PULSE STRETCHER (S-103) | As called for |
| CAL Control (R-136) | As called for |
| ADJ Control (R-183) | As called for |

Step 2. Set attenuator control to CAL, function switch to ADJ position. Adjust ADJ control to provide a reading of 10 microvolts on M-101.

Step 3. Set function switch to CAL position. Tune in the calibrator signal. Adjust CAL control for a reading of 100 microvolts on M-101.

Step 4. Set function switch to QP position, TUNING AID-PULSE STRETCHER switch to TUNING AID position. Assuming the RF circuits are still tuned as called for in Step 3, the meter indication should fluctuate due to the noise input signal and should read between 50 and 100 microvolts. To adjust the tuning aid signal output to fall within this range, adjust the probe set screw located under the cap on low-pass filter Z-101. *(See figure 7-7.)* Turn clockwise for increased signal.

**CAUTION**

If screwed in too far this probe will short against the inner conductor of the low-pass filter. When so short-circuited, little or no noise signal will be indicated and equipment sensitivity to external signals will be impaired. Still deeper penetration of this probe could break the inner conductor in the low-pass filter.

Step 5. Lock the probe adjustment by tightening the nut on the set screw. Replace the cap on the low-pass filter block.

*g.* RF INPUT LOOP ADJUSTMENT.

(1) SET-UP OF EQUIPMENT.—Using an RG-8/U coaxial cable patch cord, connect AN/URM-49 Packard Model 805A (or equivalent) Slotted Line. Using the transmission line RF Cable Assembly CG-92D/U (20′ 0″), connect the RI-FI Meter to the load end of the slotted line. Attach the AN/URM-37 Standing Wave Indicator (or equivalent) to the slotted line detector output terminals. Make the required adjustments of signal generator, slotted line indicator, and RI-FI Meter to obtain output indications on the RI-FI Meter and the standing wave indicator at the test frequency of 800 megacycles.

(2) LOOP ADJUSTMENT FOR MINIMUM VOLTAGE STANDING WAVE RATIO.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | X10 |
| Function (S-102) | QP |
| Tuning Dial Frequency | 800 megacycles |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |
| CAL Control (R-136) | Adjust for standard gain |
| ADJ Control (R-183 | |

Step 2. Carefully adjust the RI-FI Meter controls, especially the RF TRIM control, for maximum meter indication. Take the measurement of voltage standing wave ratio (VSWR). The VSWR should not be greater than 1.2.

Step 3. If VSWR is greater than 1.2, change the spacing between the input loop L-110 and the RF butterfly assembly Z-102. *(See figure 7-6.)* Replace the cover on the RF section. Repeat the VSWR measurement, making sure to readjust the RF TRIM control after each adjustment of L-110 before taking VSWR measurement.

**Note**

The cover on the RF section must be in place when making all VSWR measurements.

## 10. CORRECTING CHART SET PT-430/URM-17A AFTER ALIGNMENT.

*a.* GENERAL.—Data plotted on all charts of Chart Set PT-430/URM-17A have been plotted for the individual equipment as shipped. Upon completing the maintenance procedures described in paragraph 9, it is necessary to obtain new data and plot these charts accordingly. The original plot can be erased and new curves drawn in with pencil or draftsman's pen.

After the Radio Interference-Field Intensity Meter IM-52A/URM-17 has been aligned in accordance with instructions in paragraph 9, obtain data for Chart Set PT-430/URM-17A at each of the following calibrating frequencies:

CALIBRATION FREQUENCIES (MEGACYCLES)

| | |
|---|---|
| 375 | 750 |
| 400 | 800 |
| 425 | 850 |
| 450 | 875 |
| 500 | 900 |
| 550 | 925 |
| 600 | 950 |
| 650 | 975 |
| | 1000 |

*b.* CALIBRATING PROCEDURE.

(1) STANDARD GAIN.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | CAL |
| Function (S-102) | As called for |
| Tuning Dial Frequency | As called for |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |
| ADJ Control (R-183) | As called for |
| CAL Control (R-136) | As called for |

Step 2. Set function switch to ADJ position. Adjust ADJ control for a reading of 10 microvolts on M-101.

Step 3. Set function switch to CAL position. Tune in internal calibrating signal (approximately 800 megacycles) and adjust RF TRIM and MIXER TRIM controls for maximum meter indication.

Step 4. Adjust CAL control for a meter reading of 100 microvolts. This setting of the CAL control should not be changed until the equipment gain is again standardized.

(2) CHART #2, CORRECTION FACTORS FOR USE WITH RF PROBE DT-194/URM-17A.

**Note**

Because the equipment set-up is the same, data for Chart #3 can be taken along with data for Chart #2. See paragraph 10*b*(4).

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | As called for |
| Function (S-102) | FI |
| Tuning Dial Frequency | As called for |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |

Step 2. Using a transmission line CG-92D/U (20′ 0″), connect the RI-FI Meter to the appropriate signal generator:

| | |
|---|---|
| 375- 550 megacycles | AN/URM-26 Series |
| 550-1000 megacycles | AN/URM-49 Series |

**Note**

The absolute value of calibration depends on the accuracy of the calibrating source.

Step 3. Set the RI-FI Meter attenuator to X10 position. Adjust RI-FI Meter to 375 megacycles on the tuning dial and adjust RF TRIM and MIXER TRIM controls for maximum meter indication on signal from signal generator.

Step 4. Adjust the signal generator output to provide a 100-microvolt deflection at M-101.

Step 5. Divide the signal generator output in microvolts by the RI-FI meter indicated output (100 microvolts times attenuator factor X10 equals 1000 microvolts). This product is the correction factor at 375 megacycles for attenuator positions X10 and X$10^2$. This factor applies to both attenuator positions since the R-F termination is the same.

Step 6. Repeat Steps 3 and 4, using the X$10^3$ attenuator position. Compute correction factor as in Step 5 for attenuator positions X$10^3$, X$10^4$, and X$10^5$. This factor applies to these attenuator positions since the RF termination remains the same.

Step 7. Repeat Steps 1 through 6 for each calibration frequency.

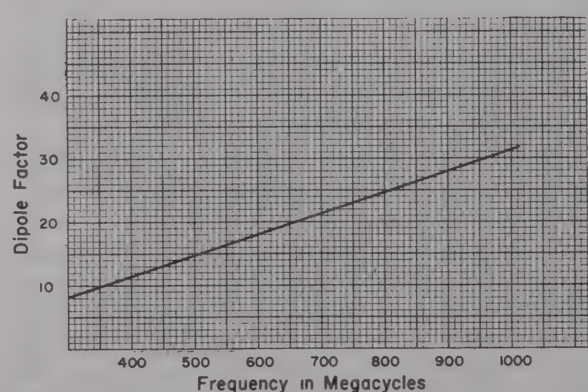



***Figure 7-12. Antenna AT-792/URM-17A Dipole Factors For Use in Plotting Chart #1 of Chart Set PT-430/URM-17A***

Step 8. Using the vertical scales of Chart #2, plot the data at each frequency. Draw a smooth curve through the plotted points of each group.

(3) CHART #1, CORRECTION FACTORS FOR USE WITH ANTENNA AT-792/URM-17A. — This correction factor is computed from the formula:

$K_1 = K_2.K_d$

where $K_2$ is the factor obtained from Chart #2
$K_d$ is the dipole factor obtained from figure 7-12

The dipole factors are derived from measurements taken of impedance between the dipole elements and from measurements of physical dimensions. These factors are plotted in figure 7-12 and apply to all Antenna AT-792/URM-17A units.

**Note**

Data shown in figure 7-12 is required for plotting data in Chart #1 only. It is not used in operating Radio Test Set AN/URM-17A.

Compute the corresponding $K_1$ factor from each of the $K_2$ factors determined in paragraph 10*b*(2). Using vertical scales of Chart #1, plot $K_1$ factor data at each frequency. Draw a smooth curve through the plotted points of each group.

(4) CHART #3, BANDWIDTH. — The overall bandwidth of the RI-FI Meter is influenced by the selectivity of the RF tuned circuits Z-102 and Z-103 (RF and mixer butterfly circuits). Bandwidth data must therefore be taken at radio frequencies.

Step 1. SET-UP OF OPERATING CONTROLS:

| | |
|---|---|
| Attenuator | X10 |
| Function (S-102) | FI |
| Tuning Dial Frequency | As called for |
| TUNING AID-PULSE STRETCHER (S-103) | OFF |
| CAL Control (R-136) | Adjust for standard gain |
| ADJ Control (R-183) | |

Step 2. Using transmission line CG-92D/U (20′ 0″), connect the RI-FI Meter to the appropriate signal generator:

| | |
|---|---|
| 375- 550 megacycles | AN/URM-26 Series |
| 550-1000 megacycles | AN/URM-49 Series |

Step 3. Adjust the signal generator to 375 megacycles and tune the RI-FI Meter to the signal generator, adjusting RF TRIM and MIXER TRIM controls for maximum meter indication,

Step 4. Adjust the signal generator output to provide some convenient up-scale deflection on the RI-FI Meter, such as 80 microvolts.

Step 5. Increase signal generator output by 6 db.

Step 6. Decrease the signal generator frequency to about 370 megacycles, then slowly increase the frequency beyond 375 megacycles. Observe the two signal generator frequencies at which the indicating meter of the RI-FI Meter reads 80 microvolts. Record the difference in frequency between the two observed points, the difference frequency being the 6 db bandwidth at that calibrating frequency.

**Note**

In order to counteract backlash in the signal generator tuning mechanism, always sweep the signal generator frequency continuously in one direction from a point below the calibrating frequency upward to a point above the calibrating frequency.

Step 7. Repeat Steps 3 through 6 for each of the following frequencies: 550, 750, and 1000 megacycles.

Step 8. Multiply the 6 db bandwidth readings of Step 6 and 7 by a factor of 1.06. The result is the effective impulse bandwidth used in Chart #3. Using the vertical scale of Chart #3 plot these points of impulse bandwidth in kilocycles. Draw a smooth curve through the plotted points. Typical effective impulse bandwidth values are as follows:

| *Frequency (megacycles)* | *Effective impulse Bandwidth (megacycles)* |
|---|---|
| 375 | 0.6 |
| 550 | 0.75 |
| 750 | 0.9 |
| 1000 | 1.05 |

TABLE 7-1. ELECTRON TUBE OPERATING VOLTAGES

| SYMBOL | TUBE | FUNCTION | PLATE VOLTS | SCREEN VOLTS | SUPP VOLTS | CATH VOLTS | GRID VOLTS | HEATER A.C. VOLTS |
|---|---|---|---|---|---|---|---|---|
| V-101 | 9005 | Calib. Diode | * —.79 | — | — | 0 | — | 3.5 |
| V-102 | 6F4 | Calib. Osc. | * 40. | — | — | 0 | —1.25 | 6.3 |
| V-103 | 6F4 | Local Osc. | 136 | — | — | 0 | —1.7 | 6.3 |
| V-104 | 6BH6 | 1st IF Amplifier | 212 | 122 | 0 | 1.0 | 0 | 6.2 |
| V-105 | 6BH6 | 2nd IF Amplifier | 212 | 112 | 0 | 1.0 | 0 | 6.2 |
| V-106 | 6BH6 | 3rd IF Amplifier | 215 | 208 | 0 | *** 6.16 | 0 | 6.2 |
| V-107 | 6BH6 | 4th IF Amplifier | 216 | 181 | 0 | 20.3 | ** .1 | 6.2 |
| V-108 | 6BH6 | 5th IF Amplifier | 217 | 137 | 0 | 1.32 | 0 | 6.2 |
| V-109 | 6AR5 | 6th IF Amplifier | 203 | 153 | 0 | 10.5 | 0 | 6.2 |
| V-110 | 5726 | 2nd Detector | (P2) 13, (P7) 9.5 | — | — | 13.6 | 0 | 6.2 |
| V-111 | 6BH6 | A.G.C. Amplifier | 225 | 94 | ** 1.15 | 1.15 | ** .1 | 6.3 |
| V-112 | 6135 | V.T.V.M. | 137 | — | — | 21.2 | .1 | 6.3 |
| V-113 | 6135 | V.T.V.M. | 137.5 | — | — | 21.6 | ** .1 | 6.3 |
| V-114 | 6BH6 | 1st Audio | 186 | 137 | 0 | 1.67 | 0 | 6.3 |
| V-115A | ½ 5814 | Pulse Stretcher | 198 | — | — | 4.9 | 0 | 6.3 |
| V-115B | ½ 5814 | 2nd Audio | 217 | — | — | 8.15 | 0 | 6.3 |
| V-116 | 5726 | Pulse Stretcher Diode | .75 | — | — | .75 | 0 | 6.3 |
| V-117 | 6299 | R-F Amplifier | 130 | — | — | 0 | 0 | 6.3 |
| V-302 | 6BH6 | Regulator | 191 | 141 | 60 | 60 | 57.5 | 6.3 |
| V-301 | 6080WA | Rectifier | (P2) 325AC<br>(P5) 325AC | — | — | 245 | 191 | 6.3 |
| V-303 | 5651 | Regulator Gas | 87 | — | — | — | — | — |

All measurements made with respect to chassis ground and with Attenuator on X10 and Function on F.I. except where shown otherwise. All voltages measured with 20,000 ohm/volt meter (AN/PSM-4 Series or equivalent).
*Attenuator on X10 and Function on ADJ.
**Measured with respect to circuit ground (see figure 7—16).
***Depends on front panel control settings.

## TABLE 7-2. WINDING DATA

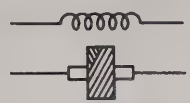
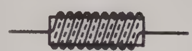
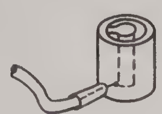
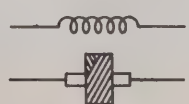
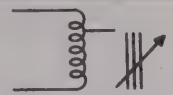
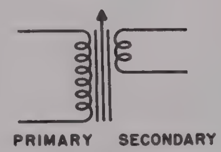
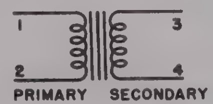
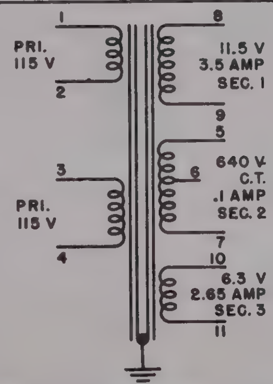
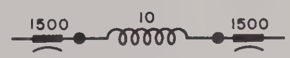
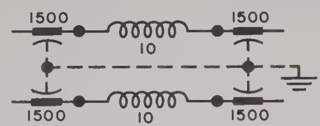
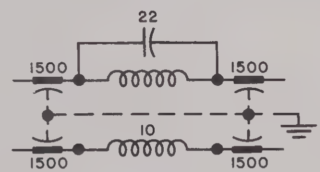
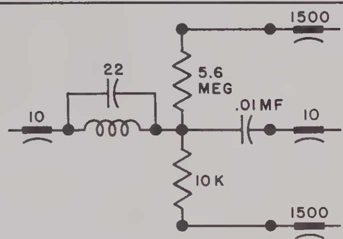
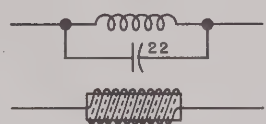
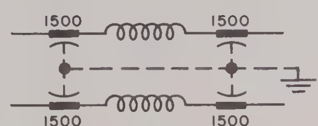
| SYMBOL DESIG. | STODDART PART NO. | DIAGRAM | WINDING | WIRE SIZE | TURNS | D C RESISTANCE IN OHMS | REMARKS |
|---|---|---|---|---|---|---|---|
| L-101<br>L-102<br>L-112<br>L-113<br>L-122 | 10360 |  | SINGLE PIE UNIVERSAL WOUND | 39 S.N. | 51 | 2.25 | RF CHOKE<br>10 MICROHENRIES |
| L-103<br>L-104<br>L-107<br>L-108<br>L-109<br>L-111<br>L-116<br>L-117 | 90384-1 |  | SINGLE | 24 E | 10 | LOW | RF CHOKE<br>FORM IS 1-WATT RESISTOR |
| L-114 | 90705-1 |  | SINGLE | 24 E | 17 | LOW | RF CHOKE<br>FORM IS 1-WATT RESISTOR |
| L-110 | 90473-1 |  | SINGLE TURN $\frac{1}{2}$" DIA. | 20 GAUGE BRASS WIRE SILVER PLATED | 1 | LOW | RF INPUT |
| L-115 | 90617-1 |  | SINGLE | RESISTOR, 187 DIA. X 537 LG. | 1 | 50 | CALIBRATOR OUTPUT |
| L-123 | 90481-1 |  | SINGLE PIE UNIVERSAL WOUND | 38 S.N.E. | 708 | 38 | PEAKING COIL<br>1.9 MILLIHENRIES |

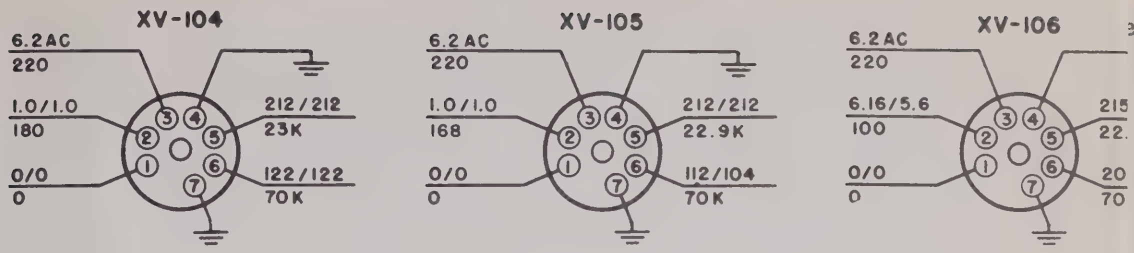
TABLE 7-2. WINDING DATA (cont'd)

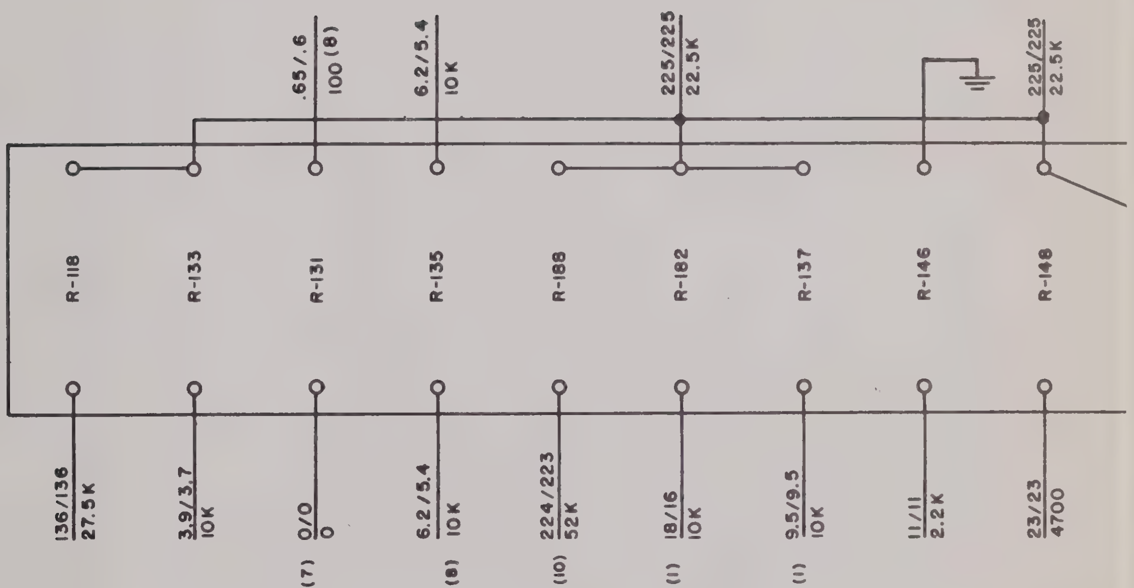
| SYMBOL DESIG. | STODDART PART NO. | DIAGRAM | WINDING | WIRE SIZE | TURNS | DC RESISTANCE IN OHMS | IMPEDANCE RATIO | HIPOT AC VOLTS | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| T-101 | 90376 |  | PRIMARY | 25 E | 9 | LOW | | | TAPPED AT 3RD TURN |
| T-102 | 90377-1 |  | PRIMARY | 25 E | 9½ | LOW | | | SOLENOID WOUND |
| | | | SECONDARY | 25 E | 3 | LOW | | | |
| T-103 | 90377-2 | | PRIMARY | 25 E | 9½ | LOW | | | SOLENOID WOUND |
| | | | SECONDARY | 25 E | 4 | LOW | | | |
| T-104 | 90377-3 | | PRIMARY | 25 E | 9½ | LOW | | | SOLENOID WOUND |
| | | | SECONDARY | 25 E | 5 | LOW | | | |
| T-105 | 90377-4 | | PRIMARY | 25 E | 8½ | LOW | | | SOLENOID WOUND |
| | | | SECONDARY | 25 E | 5 | LOW | | | |
| T-106 | 90377-4 | | PRIMARY | 25 E | 8½ | LOW | | | SOLENOID WOUND |
| | | | SECONDARY | 25 E | 5 | LOW | | | |
| T-107 | 90377-5 | | PRIMARY | 25 E | 6 | LOW | | | SOLENOID WOUND |
| | | | SECONDARY | 25 E | 5 | LOW | | | |
| T-108 | 10128 |  | PRIMARY 1-2 | 41 E | 3600 | 860 | 1 TO .06 | 1000 V | IMP. 10,000 OHMS |
| | | | SECONDARY 3-4 | 36 E | 960 | 95 | | 1000 V | IMP. 600 OHMS |
| T-301 | 10386 |  | PRIMARY TERMINALS | | | | | | CORE: 2¼" STACK ALLEGHANY LUDIUM EI-125-GRADE "C" |
| | | | 1-2 | 24 E | 235 | 3.5 | | 500 V | |
| | | | 3-4 | 24 E | 235 | 3.75 | | 500 V | |
| | | | SECONDARY 8-9 | 16 E | 23½ | LOW | | 500 V | |
| | | | SECONDARY 5-6-7 | 31 E | 1392 C.T. | 125 | | 1500 V | |
| | | | SECONDARY 10-11 | 17 E | 13½ | LOW | | 1500 V | |

## TABLE 7-2. WINDING DATA (cont'd)

| SYMBOL DESIG. | STODDART PART NO. | DIAGRAM | WIRE SIZE | TURNS OF CHOKE | DC RESISTANCE OF CHOKE | REMARKS |
|---|---|---|---|---|---|---|
| Z-106<br>Z-107<br>Z-109<br>Z-111 | 90379-1 |  | 39 S.N.E | 51 | 2.25 | CHOKE SAME AS L-101 |
| Z-108 | 90380-1 |  | 39 S.N.E | 51 | 2.25 | CHOKE SAME AS L-101 |
| | | | 39 S.N.E | 51 | 2.25 | |
| Z-110 | 90381-1 |  | 22 E FORMVAR | 12 | LOW | CHOKE SAME AS Z-113 |
| | | | 39 S.N.E | 51 | 2.25 | CHOKE SAME AS L-101 |
| Z-112 | 90382-1 |  | 22 E FORMVAR | 12 | LOW | CHOKE SAME AS Z-113 |
| Z-113<br>Z-114<br>Z-115<br>Z-116<br>Z-117<br>Z-118 | 90385-1 |  | 22 E FORMVAR | 12 | LOW | CHOKE WOUND ON CAPACITOR ERIE CC-21-SL-220-G TUNED-60 MC. |
| Z-301 | 90386-1 |  | 24 E FORMVAR | 10 | LOW | CHOKE SAME AS L-103 |
| | | | 24 E FORMVAR | 10 | LOW | |

NOTE: UNLESS OTHERWISE STATED, ALL CAPACITANCE VALUES ARE IN MICRO-MICROFARADS AND INDUCTANCE VALUES IN MICROHENRIES.




**NOTES**

(1) Depends on settings of under chassis controls. Do not change control settings except in alignment and calibration procedures.

(2) Plate volts taken at input filter at junction of R-118 and C-108.

(3) Function switch to ADJ position when measuring diode cathode or calibrator plate, ADJ control R-183 should be set for meter reading of 10 microvolts. Plate voltage of calibrator is taken at output of filter C-115; plate of diode at C-126.

(4) With Function Switch in F I. In CAL position reading of 42.5 K ohms to ground is obtained.

(5) Readings taken from circuit ground. Attenuator in X10 position unless otherwise specified.

(6) Local oscillator plate voltage should be taken with Frequency Dial set to approximately 40C

(7) No voltage from R-131 to ground. Zero resistance in CAL or X10 position of RF attenuator.

(8) Depends on Front Panel control settings.

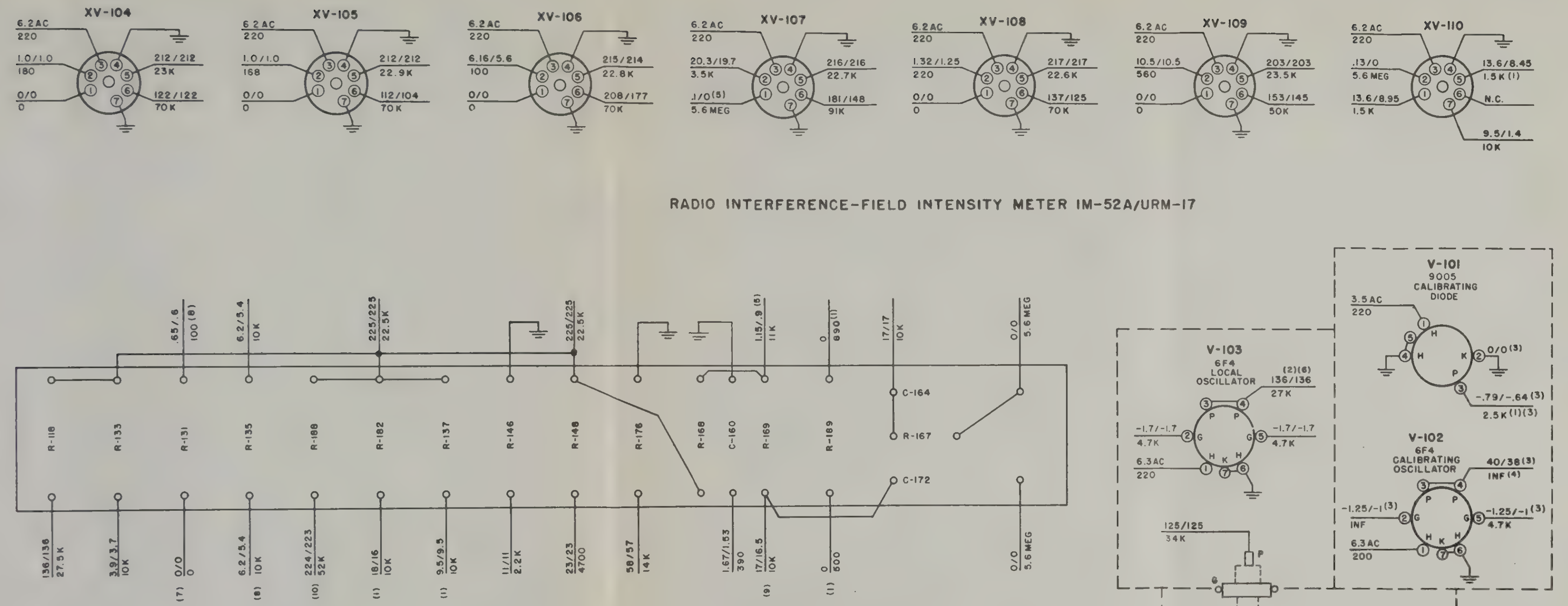
(9) Noise set at one microvolt.

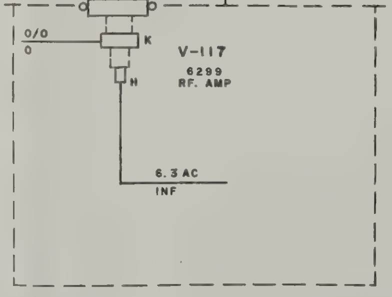
(10) With Function Switch in CAL or ADJ position, 58 volts.

NAVSHIPS 93083A
AN/URM-17A

NAVSHIPS 93083A
AN/URM-17A

NAVSHIPS 93083A
AN/URM-17A


## NOTES

(1) Depends on settings of under chassis controls. Do not change control settings except in alignment and calibration procedures.

(2) Plate volts taken at input filter at junction of R-118 and C-108.

(3) Function switch to ADJ position when measuring diode cathode or calibrator plate, ADJ control R-183 should be set for meter reading of 10 microvolts. Plate voltage of calibrator is taken at output of filter C-115; plate of diode at C-126.

(4) With Function Switch in F I. In CAL position reading of 42.5 K ohms to ground is obtained.

(5) Readings taken from circuit ground. Attenuator in X10 position unless otherwise specified.

(6) Local oscillator plate voltage should be taken with Frequency Dial set to approximately 400 mc.

(7) No voltage from R-131 to ground. Zero resistance in CAL or X10 position of RF attenuator.

(8) Depends on Front Panel control settings.

(9) Noise set at one microvolt.

(10) With Function Switch in CAL or ADJ position, 58 volts.

## CONDITIONS OF MEASUREMENT

1. All measurements are made from point shown to chassis except where otherwise indicated.
2. All voltage measurements are made with both 20,000 and 1,000 ohm/volt meters. The 20,000 ohm/volt reading is given first, followed by the 1,000 ohm/volt reading.
3. Readings followed by "A.C." were obtained with a 1,000 ohm/volt A.C. voltmeter.
4. All resistance measurements made with units disconnected and all tubes and pilot lights removed, also all front panel pots fully counter clockwise unless otherwise specified.
5. Measurements made with Function Switch on FI, Pulse Stretcher on OFF and Attenuator in X10 position unless otherwise specified.

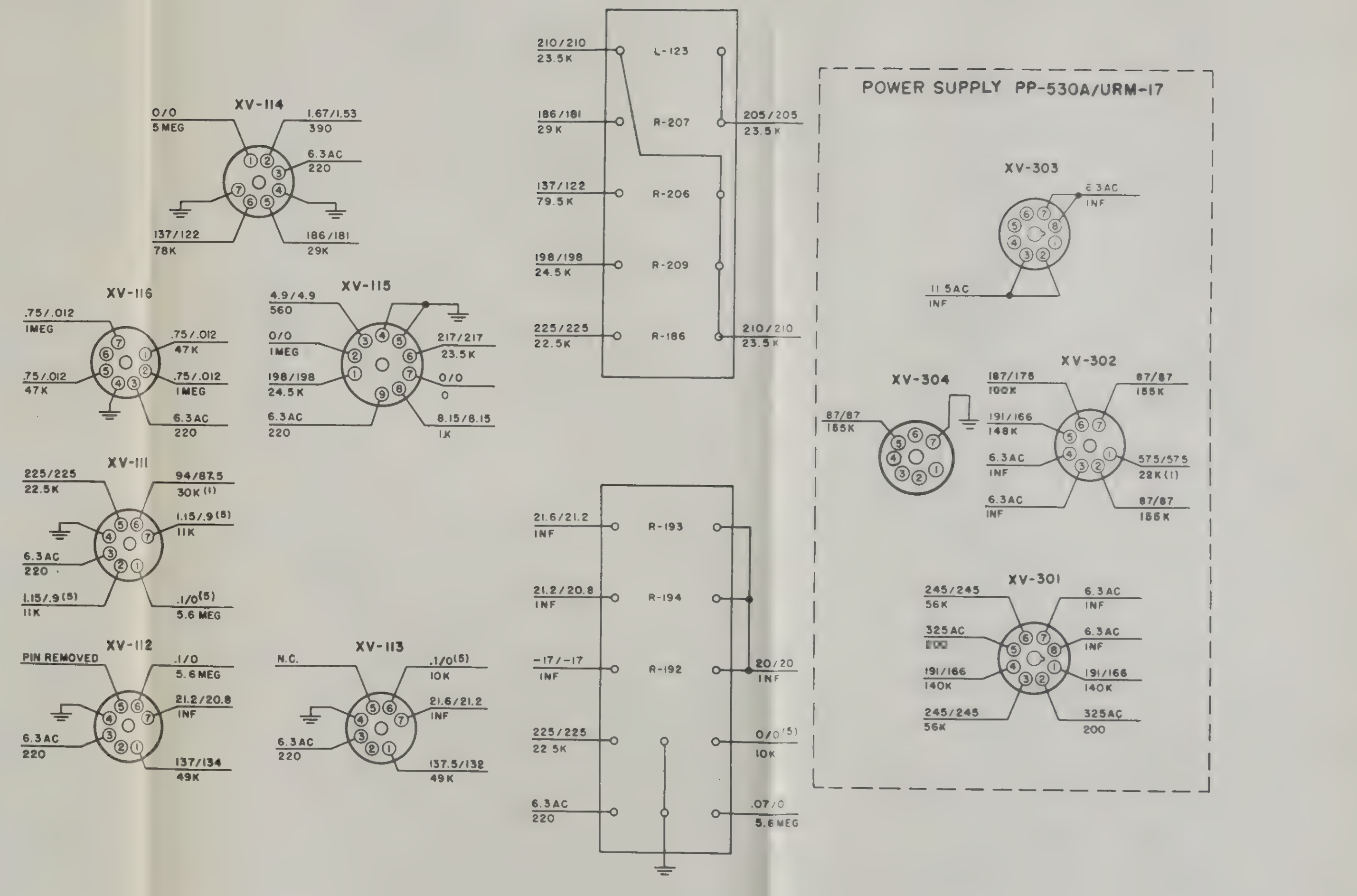
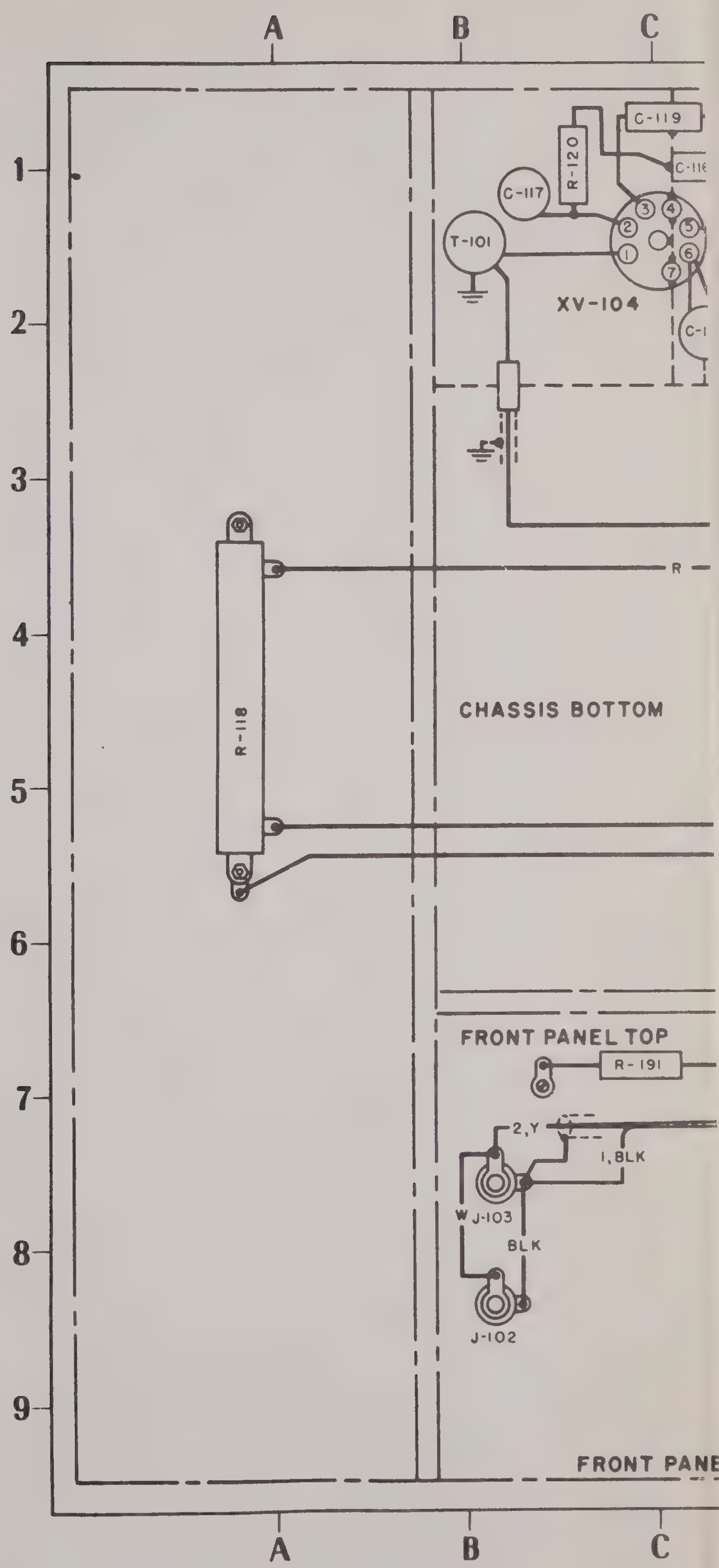



Figure 7-13. Radio Test Set AN/URM-17A, Voltage and Resistance Data

| Wire Number | From | Coordinates | To | Coordinates | Wire Number | From | Coordinates | To | Coordinates |
|---|---|---|---|---|---|---|---|---|---|
| 1 | J-103 | 7B | LUG | 4T | 29 | S-102D | 8L | R-198 | 6L |
| 2 | J-103 | 7B | T-108 | 4S | 30 | S-102E | 8M | R-184 | 6D |
| 3 | R-170 | 8D | S-102B | 8I | 31 | S-102E | 8M | R-183 | 9O |
| 4 | R-170 | 8D | S-102C | 8K | 32 | S-102E | 8M | C-115 | 8P |
| 5 | R-213 | 8E | XV-115 | 3S | 33 | R-183 | 9O | R-188 | 4G |
| 6 | S-103 | 8F | E-101 | 8Q | 34 | R-136 | 8O | R-137 | 4H |
| 7 | S-103 | 8F | CR-101 | 7U | 35 | R-136 | 8O | R-135 | 4F |
| 8 | S-103 | 8F | XV-116 | 3Q | 36 | R-136 | 8O | XV-112 | 6Q |
| 9 | S-103 | 8F | XV-115 | 3S | 37 | C-172 | 4M | Z-112 | 2P |
| 10 | S-102A | 8H | R-198 | 6L | 38 | Z-108 | 3H | XV-111 | 4Q |
| 11 | S-102A | 8H | R-178 | 6N | 39 | R-169 | 4L | XV-113 | 5S |
| 12 | S-102A | 8H | Z-109 | 3J | 40 | R-169 | 4L | XV-111 | 4Q |
| 13 | S-102B | 8I | XV-112 | 6Q | 41 | R-198 | 6L | XV-112 | 6Q |
| 14 | S-102B | 8I | C-172 | 4M | 42 | R-168 | 4J | R-196 | 6S |
| 15 | S-102B | 8I | C-164 | 4M | 43 | R-177 | 5J | XV-111 | 4Q |
| 16 | S-102B | 8I | C-164 | 4M | 44 | Z-110 | 3L | XV-113 | 6Q |
| 17 | S-102B | 8I | C-172 | 4M | 45 | C-110 | 3D | Z-110 | 3L |
| 18 | S-102B | 8K | LUG | 2Q | 46 | R-131 | 4F | S-101 | 3O |
| 19 | S-102C | 8K | Z-112 | 2P | 47 | LUG | 6M | LUG | 5S |
| 20 | S-102C | 8K | R-179 | 6M | 48 | J-101 | 8S | XV-113 | 6S |
| 21 | S-102C | 8K | C-163 | 2O | 49 | J-101 | 8S | LUG | 4T |
| 22 | S-102C | 8K | R-181 | 6H | 50 | C-128 | 8P | CR-101 | 7U |
| 23 | S-102C | 8K | R-179 | 6M | 51 | R-184 | 6D | C-126 | 8P |
| 24 | S-102C | 8K | R-180 | 5G | 52 | E-101 | 8Q | C-112 | 8U |
| 25 | S-102D | 8L | M-101 | 7R | 53 | S-102A | 9G | R-189 | 5L |
| 26 | S-102D | 8L | J-101 | 8S | 54 | C-160 | 5K | XV-114 | 2R |
| 27 | S-102D | 8L | M-101 | 7R | 55 | R-189 | 5L | R-178 | 6N |
| 28 | S-102D | 8L | R-178 | 6N | | | | | |


A
B
C
1
2
3
4
5
6
7
8
9
C-119
R-120
C-117
T-101
XV-104
R-118
R
CHASSIS BOTTOM
FRONT PANEL TOP
R-191
2,Y
1,BLK
W
J-103
BLK
J-102
FRONT PANE

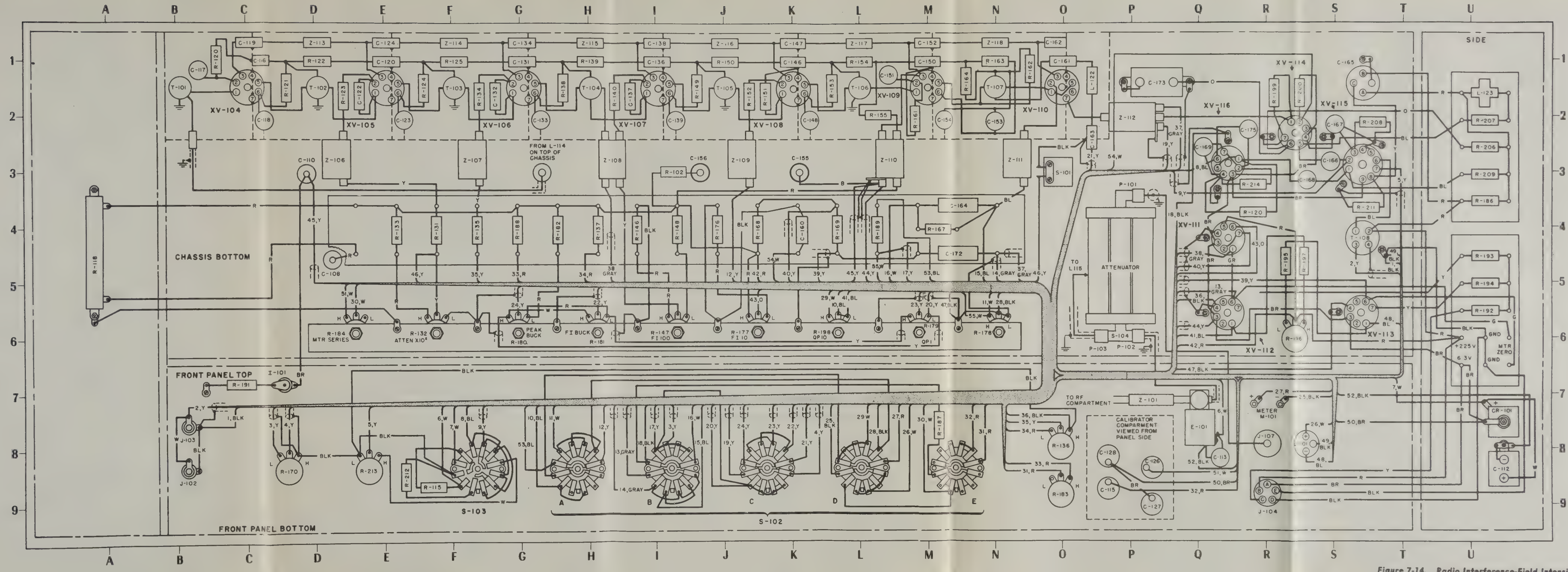



Figure 7-14. Radio Interference-Field Intensity Meter IM-52A/URM-17, Practical Wiring Diagram

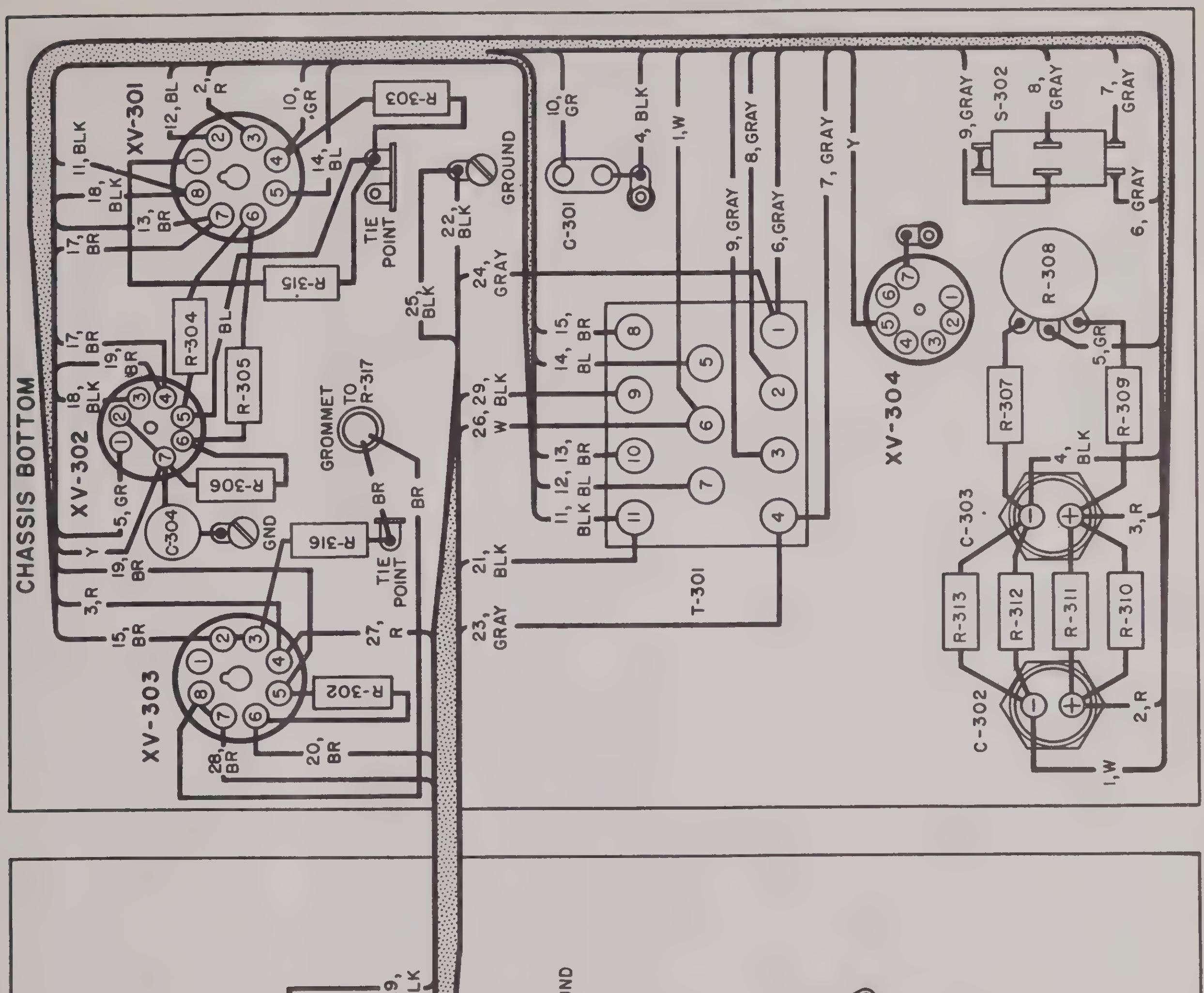
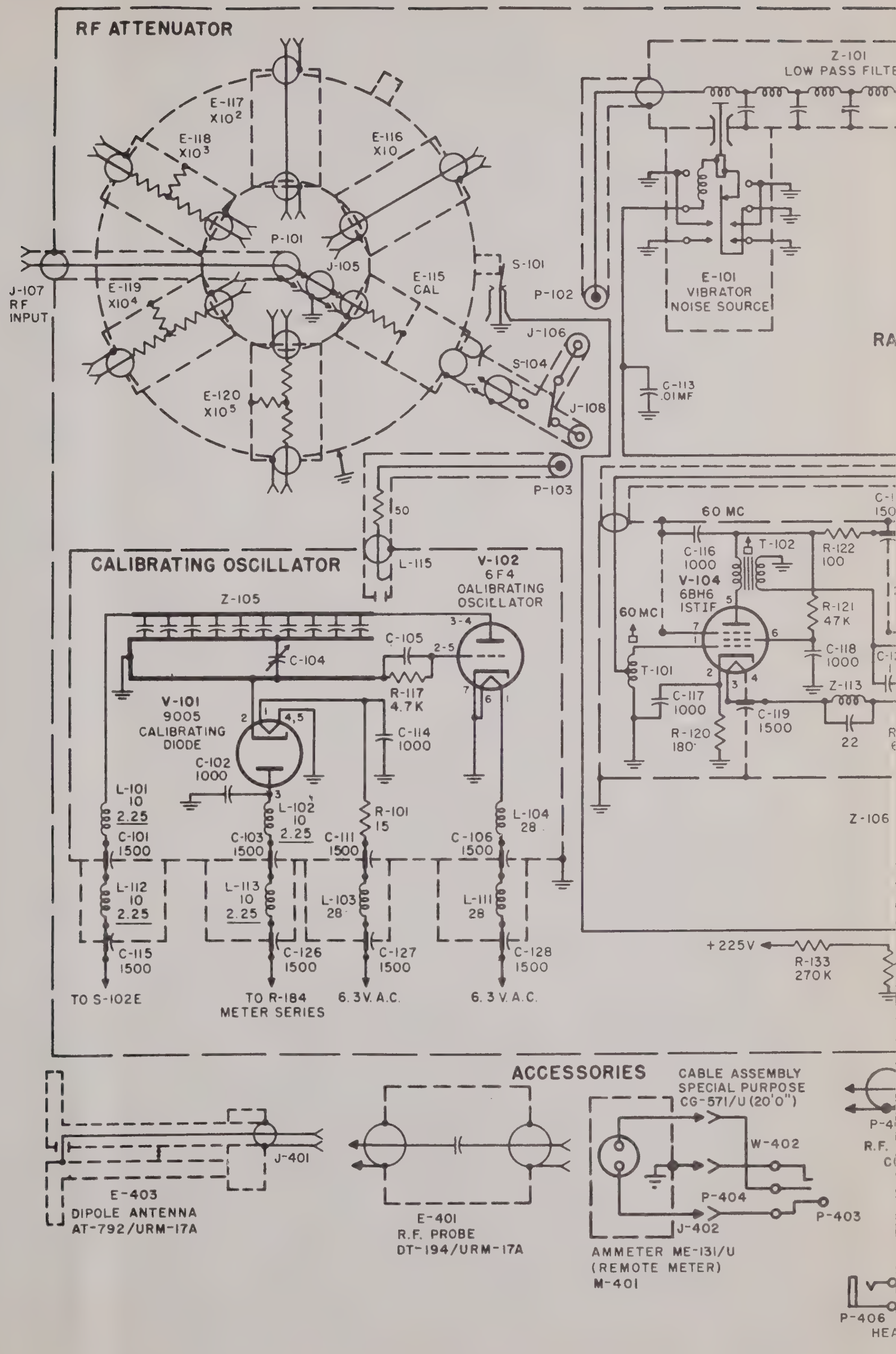


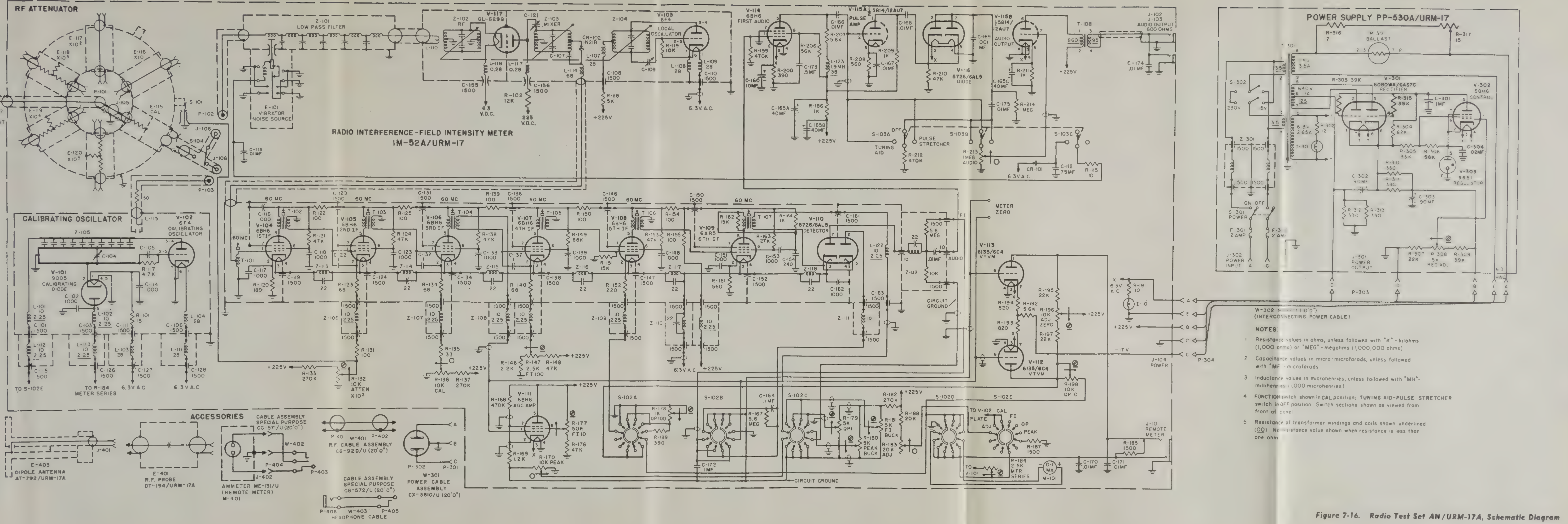

**Figure 7-15. Power Supply PP-530A/URM-17, Practical Wiring Diagram**


RF ATTENUATOR
E-117
X10²
E-118
X10³
E-116
X10
P-101
J-105
E-115
CAL
S-101
J-107
RF
INPUT
E-119
X10⁴
P-102
J-106
S-104
J-108
E-120
X10⁵
P-103
Z-101
LOW PASS FILTE
E-101
VIBRATOR
NOISE SOURCE
C-113
.01MF
RA
CALIBRATING OSCILLATOR
L-115
50
V-102
6F4
CALIBRATING
OSCILLATOR
Z-105
C-105
C-104
R-117
4.7K
V-101
9005
CALIBRATING
DIODE
C-114
1000
C-102
1000
L-101
10
2.25
C-101
1500
L-102
10
2.25
C-103
1500
R-101
15
C-111
1500
L-104
28
C-106
1500
L-112
10
2.25
L-113
10
2.25
L-103
28
L-111
28
C-115
1500
C-126
1500
C-127
1500
C-128
1500
TO S-102E
TO R-184
METER SERIES
6.3 V.A.C.
6.3 V.A.C.
60 MC
C-116
1000
T-102
R-122
100
V-104
6BH6
1STIF
60MC
R-121
47K
C-118
1000
T-101
Z-113
C-117
1000
C-119
1500
R-120
180
22
Z-106
+225V
R-133
270K
ACCESSORIES
CABLE ASSEMBLY
SPECIAL PURPOSE
CG-571/U (20'0")
J-401
E-403
DIPOLE ANTENNA
AT-792/URM-17A
E-401
R.F. PROBE
DT-194/URM-17A
W-402
P-404
P-403
J-402
AMMETER ME-131/U
(REMOTE METER)
M-401
R.F.
P-406
HEA

NAVSHIPS 93083A
AN/URM-17A

NAVSHIPS 93083A
AN/URM-17A

NAVSHIPS 93083A
AN/URM-17A




NOTES:

1. Resistance values in ohms, unless followed with "K" - kilohms (1,000 ohms) or "MEG" - megohms (1,000,000 ohms)
2. Capacitance values in micro-microfarads, unless followed with "MF" - microfarads
3. Inductance values in microhenries, unless followed with "MH" - millihenries (1,000 microhenries)
4. FUNCTION switch shown in CAL position; TUNING AID-PULSE STRETCHER switch in OFF position. Switch sections shown as viewed from front of panel
5. Resistance of transformer windings and coils shown underlined (OO). No resistance value shown when resistance is less than one ohm

*Figure 7-16. Radio Test Set AN/URM-17A, Schematic Diagram*

# SECTION 8

# PARTS LIST

## 1. INTRODUCTION.

Reference designations have been assigned to identify all maintenance parts of the equipment. They are used for marking the equipment (adjacent to the part they identify) and are included in drawings, diagrams, and the parts list. The letter of the reference designation indicates the kind of part (generic group), such as resistor, electron tube, etc. The number portion of the reference designation differentiates between parts of the same generic group.

Radio Test Set AN/URM-17A includes two major units, the Receiver and Power Supply. In addition to the major unit, the Radio Test Set AN/URM-17A includes such accessory equipment as a Tripod, Mast Section, Azimuth Indicator, Antenna, Multi-Scale Meter, and Cables.

Each major unit has been assigned a block of series numbers. For example, the Receiver has been assigned the blocks of series numbers 100-399. The Power Supply and the accessories are circuits within the Receiver, and have been assigned the blocks of series numbers 300-399.

A socket associated with a particular plug-in device, such as an electron tube or a fuse, is identified by a reference designation that includes a number portion of the reference designation of the plug-in device. For example, the socket for electron tube V-104 is designated XV-104.

## 2. MAINTENANCE PARTS LIST.

Table 8-1 lists both major units and their maintenance parts. Parts of each major unit are grouped together.

Column 1 lists the reference series of each major unit followed by the reference designations of the various parts in alphabetical and numerical order.

Column 2 refers to the explanatory notes that appear in paragraph 7 of this section.

Column 3 gives the name and description of the various parts. Complete information is given for all key parts (parts differing from any parts previously listed in the table). The name and description are omitted for similar parts previously described within both major units, however, reference is made to the key part for the data.

Column 4 indicates the function of the part and gives its functional location in the equipment.

## 3. STOCK NUMBER IDENTIFICATION AND LOCATION OF PARTS SUPPLIED.

Table 8-2 is arranged by reference designation. The STOCK NUMBER column gives stock numbers for key parts in either Federal or Signal Corps. Therefore, to use this table properly, obtain the reference designation for the part to be replaced. Then find its corresponding key reference designation from table 8-1 before using table 8-2.

The location of the maintenance parts can be obtained from the packing list in the maintenance parts boxes.

## 4. STOCK NUMBER CROSS REFERENCE.

Table 8-3 lists by stock numbers all key parts that have been assigned stock numbers. If the stock number of a part used in this equipment is known, this table provides the corresponding reference designation.

## 5. LIST OF MANUFACTURERS.

Table 8-4 lists manufacturers of parts used in the equipment. The prefix letters or abbreviations are assigned by the Bureau of Ships. These prefix letters or abbreviations are used in descriptions of table 8-1.

## 6. COLOR CODE.

Table 8-5 lists the standard color codes used on resistors and capacitors.

## 7. NOTES.

The following notes provide additional information concerning items listed in table 8-1.

| NOTES | DEFINITIONS |
|---|---|
| P1 | Applied to parts which are procured in view of relatively high usage but which are very difficult, impractical, or uneconomical to manufacture. Code "P1" indicates that the part is available in the supply system. |
| P2 | Applied to parts for which little usage is anticipated but which are procured in limited quantity for insurance purposes. Parts coded "P2" are difficult to manufacture, require special tooling not normally available within the Naval Establishment, or require long production lead time. |
| X1 | Applied to parts for which procurement of the next larger assembly source coded "P" is justified; e.g., an internal detail part, such as welded segments inseparable from its assembly, a part which must be machined and installed with other parts in a matched set, or a part of an assembly, which, if required, would suggest extensive reconditioning of each assembly. |
| X2 | Applied to parts which are not procured for stock but may be acquired for use through salvage. Activities requiring such parts will |

attempt to obtain from salvage; if not obtainable from salvage, such parts will be requisitioned through normal supply channels with supporting justification. Repeated requests may justify a change to a "P" source code.

A Applied to assemblies which are not procured but which are to be assembled within the Naval Establishment prior to installation. At least one of the parts in the assembly must be a "P" series part which carries an individual part number and description.

F Activity to which equipment is assigned (e.g. vessel, FASRON or self-supported squadron).

R Repairable parts which are uneconomical and practical to repair. Replacements will be obtained and expended parts returned in accordance with instructions issued by the inventory manager.

C Consumable (expendable) parts that are neither repairable nor salvageable (optional).

In assigning the above listed codes, the following sequence will be followed: The first letter or letter plus digit gives consumer source information; the second and third letter give respectively the lowest maintenance echelon capable of installing the part and the lowest maintenance echelon capable of manufacturing, assembling of testing a part prior to installation; the fourth letter gives the recoverability status.

**TABLE 8-1. MAINTENANCE PARTS LIST**

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A | |
| 100-399 | AFFR | RADIO INTERFERENCE — FIELD INTENSITY METER UNIT: 375 to 1000 mc frequency range; ±2% frequency; meter type, 0 to 100 microvolts and 0 to 40 db ranges; 52 ohms nominal input impedance; operates from Power Supply PP-530A/URM-17; 19-13/16 in. lg (including carrying handle) by 10-3/8 in. d by 9-3/16 in. h; CADV 90328-5 (ND) | |
| C-101 | P1FFC | CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1500 mmf; plus or minus 20%; 500 VDCW; 3/4 in. lg by 5/16 in. hex; axial soft wire leads; feed-thru type; ceramic insulation; threaded 12-28 for mtg; CER 362; CADV 10364 | B+ by-pass V-102 |
| C-102 | P1FFC | CAPACITOR, FIXED, MICA DIELECTRIC: 1000 mmf plus or minus 10%; 500 VDCW; B temp coefficient 23/32 in. lg by 0.463 in. h; silver-plated brass body; 2 solder lug terminals; mtd by 3-48 screw; CAN M-28; CADV 10365-102 | RF by-pass V-101 plate |
| C-103 | | Same as C-101 | RF by-pass V-101 plate |
| C-104 | X1FFC | CAPACITOR, VARIABLE, AIR DIELECTRIC: composed of disc and screw; varies capacity between structural parts in calibrating oscillator compartment; 1.5 to 6 mmf (LISTED FOR REFERENCE ONLY; part of Z-105) | Calibrating oscillator V-102 trimming |
| C-105 | X1FFC | CAPACITOR, FIXED, TEXTOLITE DIELECTRIC: forms capacity between structural parts in calibrating oscillator compartment; 5 mmf (LISTED FOR REFERENCY ONLY; part of Z-105) | Grid coupling V-102 |
| C-106 | | Same as C-101 | Heater by-pass V-102 |
| C-107 | X1FFC | CAPACITOR, FIXED, TEXTOLITE DIELECTRIC: forms capacity between structural parts in mixer butterfly assembly; 3 mmf (LISTED FOR REFERENCE ONLY; part of Z-103) | Crystal coupling at Z-103 |
| C-108 | | Same as C-101 | B+ by-pass V-103 |
| C-109 | X1FFC | CAPACITOR, VARIABLE: textolite dielectric; forms capacity between structural parts of oscillator butterfly assembly; 1 to 3 mmf (LISTED FOR REFERENCE ONLY; part of Z-104) | Grid coupling V-103 |
| C-110 | | Same as C-101 | Heater by-pass V-103 |
| C-111 | | Same as C-101 | Heater by-pass V-101 |
| C-112 | P1FFC | CAPACITOR, FIXED, ELECTROLYTIC: JAN type CE64C750F; 75 mfd, 25 VDCW; operating temp range minus 40 degrees C plus 65 degrees C; 2-1/2 in. lg by 1 in. w by 1-5/8 in. h; hermetically sealed can; 2 solder lug terminals; mts by 2 mtg holes 2-1/8 in. c to c; Spec JAN-C-62; CD FA-10244; CADV 10383 (ND) | Vibrator E-101 supply filter |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| C-113 | P1FFC | CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 mmf, minus 20% plus 80%; 450 VDCW; disc type 19/32 in. dia by 0.156 in. thk; radial type leads, 22 gauge wire, 1-1/2 in. lg; phenolic insulation; CBN BN; CADV 10369 (ND) | Vibrator E-101 supply by-pass |
| C-114 | | Same as C-102 | Filament by-pass V-101 |
| C-115 | | Same as C-101 | B+ by-pass at V-102 |
| C-116 | | Same as C-102 | B+ by-pass V-104 |
| C-117 | | Same as C-102 | Cathode bias V-104 |
| C-118 | | Same as C-102 | Screen by-pass V-104 |
| C-119 | | Same as C-101 | Heater by-pass V-104 |
| C-120 | | Same as C-101 | B+ by-pass V-105 |
| C-121 | X1FFC | CAPACITOR, VARIABLE: air dielectric; forms capacitor with butterfly plate; soft copper 0.800 in. lg by 0.500 in. w by 0.020 in. thk (LISTED FOR REFERENCE PURPOSES ONLY; part of Z-108) | RF coupling V-117 to mixer |
| C-122 | P1FFC | CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1.0 mmf plus or minus 20%; 500 VDCW; 5/32 in. dia by 3/8 in. lg; axial leads; molded ceramic insulation; CAUZ JP-5/32; CADV 10367 | Compensating capacitor at V-105 |
| C-123 | | Same as C-102 | Screen by-pass V-105 |
| C-124 | | Same as C-101 | Heater by-pass V-105 |
| C-125 | | Not used | |
| C-126 | | Same as C-101 | Plate by-pass V-101 |
| C-127 | | Same as C-101 | Heater by-pass V-101 |
| C-128 | | Same as C-101 | Heater by-pass V-102 |
| C-129 and C-130 | | Not used | |
| C-131 | | Same as C-101 | B+ by-pass V-106 |
| C-132 | | Same as C-122 | Compensating capacitor at V-106 |
| C-133 | | Same as C-102 | Screen by-pass V-106 |
| C-134 | | Same as C-101 | Heater by-pass V-106 |
| C-135 | | Not used | |
| C-136 | | Same as C-101 | B+ by-pass V-107 |
| C-137 | | Same as C-122 | Compensating capacitor at V-107 |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| C-138 | | Same as C-101 | Heater by-pass V-107 |
| C-139 | | Same as C-102 | Screen by-pass V-107 |
| C-140 thru C-145 | | Not used | |
| C-146 | | Same as C-101 | B+ by-pass V-108 |
| C-147 | | Same as C-101 | Heater by-pass V-108 |
| C-148 | | Same as C-102 | Screen by-pass V-108 |
| C-149 | | Not used | |
| C-150 | | Same as C-101 | B+ by-pass V-109 |
| C-151 | | Same as C-102 | Cathode bias V-109 |
| C-152 | | Same as C-101 | Heater by-pass V-109 |
| C-153 | P1FFC | CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1000 mmf; plus 100% minus 0%; 500 VDCW; disc type; 3/8 in. dia by 0.174 in. thk; radial type leads, 22 gauge wire 1-1/2 in. lg; phenolic insulation; CBN D5-102; CADV 10368 (ND) | Screen coupling V-109 |
| C-154 | P1FFC | CAPACITOR, FIXED, MICA DIELECTRIC: 240 mmf; plus or minus 10%; 500 VDCW; B temp coefficient; 23/32 in. lg by 0.463 in. h; silver-plated brass body; 2 solder lug term; mtd by 3-48 screw; CAN M-28; CADV 10365-241 | V-109 neutralizing |
| C-155 | | Same as C-101* | Heater by-pass V-117 |
| C-156 | | Same as C-101* | B+ by-pass V-117 |
| C-157 thru C-159 | | Not used | |
| C-160 | P1FCC | CAPACITOR, FIXED, ELECTROLYTIC: porous tantalum anode; 10 mf, +50%; 25 VDCW; 15/32" lg x 5/16: max dia; mts by two axial wire leads 1-1/2" lg each; marked with mfr number and polarity; CATD PP10B25A2; CADV 10459 | Cathode by-pass V-114 |
| C-161 | | Same as C-101 | IF filter by-pass at V-110 |
| C-162 | | Same as C-102 | Heater by-pass V-110 |
| C-163 | | Same as C-101 | IF filter at V-110 |
| C-164 | P1FFC | CAPACITOR, FIXED, PAPER DIELECTRIC: Navy type (-484944-10); 100,000 mmf; plus or minus 10%; 400 VDCW; hermetically sealed metal covering 1.125 in. lg by 0.437 in. dia; wax impregnated; 2 axial wire leads; externally grounded; marked Stoddart 10101; CAMD ME; CADV 10101 | Weighting circuit capacitor |

*(ND) No Stoddart drawing.

TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| C-165A<br>C-165B<br>C-165C | P1FCC | CAPACITOR, FIXED, ELECTROLYTIC: JAN type CE33E400M; 3 sections; 40-40-40 mf; 250 VDCW; operating temp range minus 20°C plus 65°C; 3-3/4 in. lg by 1-3/8 in. dia. hermetically sealed metal can; 4 solder lugs 5/8 in. h on bottom of case; Spec JAN-C-62; CD CE33E400M; CADV 10137 (ND) | (a) B+ filter to V-114<br>(b) B+ filter to V-114<br>(c) Cathode bias V-115B |
| C-166 | | Same as C-113 | Audio coupling to V-115A |
| C-167 | | Same as C-113 | Cathode by-pass V-115A |
| C-168 | | Same as C-113 | Coupling to pulse stretcher V-116 |
| C-169 | | Same as C-153 | Plate by-pass V-116 |
| C-170 | | Same as C-113 | RF by-pass at J-101 |
| C-171 | | Same as C-113 | RF by-pass at J-101 |
| C-172 | | Same as C-164 | Weighting circuit capacitor |
| C-173 | P1FCC | CAPACITOR, FIXED, PAPER DIELECTRIC: JAN type CP53BIFF504X; 0.5 mfd plus 20% minus 10% VDCW; metal case 1-13/16 in. lg (less mtg tabs) by 1 in. d (less terminals) by 7/8 in. h; terminals 3/4 in. max lg; Spec JAN-C-25; CD DVR6050; CADV 10021 (ND) | Screen by-pass V-114 |
| C-174 | | Same as C-113 | RF by-pass at J-102, J-103 |
| C-175 | | Same as C-113 | Audio coupling at V-116 |
| C-176<br>thru<br>C-300 | | Not used | |
| CR-101 | P1FFC | RECTIFIER, METALLIC: selenium; 25 v RMS input; 24 vdc, 100 ma output; 1 in. square, mtg through center hole; CAFQ 1M1; CADV 10388 | Vibrator supply rectifier |
| CR-102 | P1FCC | CRYSTAL UNIT, RECTIFYING: JAN type 1N21B; 13/16 in. lg by 9/32 in. dia; Spec JAN-1-A; CHS 1N21B; CADV 10350 (ND) | Mixer |
| E-101 | P1FCC | VIBRATOR, SYNCHRONOUS: nominal voltage 2 volts; 1.5 to 2.3 volts operating range; max input 6 volt amps; single reed, 115 cps plus or minus 7 cps frequency; rectangular shape, 1-1/2 in. sq plus or minus 1/32 in.; seated height 2-1/8 in. max; special square 7-pin base; CMA T-4002; CADV 10401 | RF noise generator |

*(ND) No Stoddart drawing.

TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| E-102 | P1FFC | SHIELD, ELECTRON TUBE: JAN type TSFOT103; steel; cad plated; tubular; open top; bayonet type mtg; 0.810 in. ID by 0.941 in. OD by 2-1/4 in. lg; internal tension spring for retaining tube in socket; Spec JAN-S-28A; CMG 8698-1; CADV 10039 (ND) | Shield for V-109 |
| E-103 | P1FFC | SHIELD, ELECTRON TUBE: JAN type TSFOT101; steel; cad plated; tubular open top; cylindrical twist-on mtg slots for attaching to JAN style 10 and 11 tube sockets; 1/2 in. ID by 1-3/8 in. lg by 0.941 in. OD; internal tension spring for retaining tube in socket; Spec JAN-S-28A; CEB SOS-3; CADV 10113 (ND) | Shield for V-110 |
| E-104 | | Same as E-103 | Shield for V-116 |
| E-105 | P1FCC | SHIELD, ELECTRON TUBE: JAN type TSFOT102; steel; cad plated; open top; bayonet type mtg, 0.810 in. ID by 0.941 in. OD by 1-3/4 in. lg; internal tension spring for retaining tube in socket; Spec JAN-S-28A; CEB SOS-6; CADV 10116 (ND) | Shield for V-104 |
| E-106 | | Same as E-105 | Shield for V-105 |
| E-107 | | Same as E-105 | Shield for V-106 |
| E-108 | | Same as E-105 | Shield for V-107 |
| E-109 | | Same as E-105 | Shield for V-108 |
| E-110 | | Same as E-105 | Shield for V-111 |
| E-111 | | Same as E-105 | Shield for V-114 |
| E-112 | | Same as E-105 | Shield for V-112 |
| E-113 | | Same as E-105 | Shield for V-113 |
| E-114 | P1FCC | SHIELD, ELECTRON TUBE: JAN type TSFOT105; steel; cad plated; tubular; open top; bayonet type mtg; 1-15/16 in. lg; internal tension spring for retaining tube in socket; Spec JAN-S-28A; CMG 16G1337B; CADV 10410 (ND) | Shield for V-115 |
| E-115 | P1FCC | NETWORK, IMPEDANCE MATCHING: consists of single tubular film type fixed resistor 50-ohms mtd in coaxial tube with metal taper for impedance match; used for terminating 50-ohm coaxial line; assembly also includes side outlet connection for separate coaxial line; 9/16 in. OD by 3-31/32 in. lg overall; has special 50-ohm RF connector on each end; p/o CADV pt/dwg 90375-1; CADV 90390-1 | Antenna termination and calibrator injection |
| E-116 | P1FCC | TRANSMISSION LINE SECTION: RF transmission; 9/16 in. OD by 3 in. lg overall; has special 50 ohm RF connector on each end; p/o CADV pt/dwg 90388-1 | Used in X10 attenuator position |
| E-117 | | Same as E-116 | Used in $X10^2$ attenuator position |

*(ND) No Stoddart drawing.

TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| E-118 | P1FFC | RESISTOR, ASSEMBLY, FIXED: consists of T section attenuator using 2 series tubular film type resistors 40.91 ohms each and one shunt resistor (film disc) 10.1 ohms; mtd in coaxial tube with metal tapers for impedance match; attenuates 20 db; 9/16 in. OD by 3 in. lg; has special 50-ohm RF connector on each end; p/o CADV pt/dwg 90375-1; CADV 90389-1 | Used in $X10^3$ attenuator position |
| E-119 | P1FFC | RESISTOR ASSEMBLY, FIXED: consists of T section attenuator using 2 series tubular film type resistors 49.01 ohms each and one shunt resistor (film disc) 1.00 ohms; mtd in coaxial tube with metal tapers for impedance match; attenuates 40 db; 9/16 in. OD by 3 in. lg overall; has special 50-ohm RF connector on each end; p/o CADV pt/dwg 90375-1; CADV 90389-2 | Used in $X10^4$ attenuator position |
| E-120 | P1FFC | RESISTOR ASSEMBLY, FIXED: consists of T section attenuator using 2 series tubular film type resistors 49.9 ohms each and one shunt resistor (film disc) 0.1000 ohms; mtd in coaxial tube with metal tapers for impedance match; attenuates 60 db; 9/16 in. OD by 3 in. lg overall; has special 50-ohm RF connector on each end; p/o CADV pt/dwg 90375-1; CADV 90389-3 | Used in $X10^5$ attenuator position |
| E-121 | P1FFC | KNOB: bar; black; phenolic; for 1/4 in. dia shaft; double 6-32 set screw; white arrow marking; 1-1/8 in. dia by 11/16 in. h overall; brass insert; shaft hole 1/2 in. d; DMC AC 64969-1; CADV 10134 | Function switch S-102 knob |
| E-122 | | Same as E-121 | Pulse-stretcher switch S-103 knob |
| E-123 | P1FFC | KNOB: round; black; aluminum; for 1/4 in. dia shaft; double 6-32 set screw; no marking; 1 in. dia by 1/2 in. h overall; shaft hole 13/32 in. dia; fine straight knurl; CADV 10135 | CAL R-136 knob |
| E-124 | | Same as E-123 | RF TRIM knob |
| E-125 | | Same as E-123 | MIXER TRIM knob |
| E-126 | | Same as E-123 | PEAK R-170 knob |
| E-127 | | Same as E-123 | AUDIO R-213 knob |
| E-128 | | Same as E-123 | ADJ R-183 knob |
| E-129 | P1FFC | KNOB: black; phenolic; brass insert for 1/4 in. dia shaft; 1-5/8 in. dia; double 8-32 set screw; 90° apart; white filled indicator dot; CAUP S-309-64-DL-522; CADV 10353 | Attenuator knob |
| E-130 | P1FFC | COVER: cold rolled steel; satin chrome finish; 1-1/32 in. lg by 13/16 in. w by 17/32 in. h; contains neoprene pad 1/16 in. thk; opens 90° for plugs to 5/8 in. body dia; spring loaded cap; CAHW A23559; CADV 10311 | Cover for REMOTE METER receptacle J-101 |
| E-131 | | Same as E-130 | Cover for AUDIO OUTPUT J-102 |
| E-132 | | Same as E-130 | Cover for AUDIO OUTPUT J-103 |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| E-133 | P1FFC | SOCKET, TUBE: 5 contact acorn modified; consists of phenolic base, brass grounding bracket with 4 riveted contacts; 1-9/16 in. lg by 1-1/16 in. w by 5/16 in. h approx less terminals used as socket for 4 pins on diode tube; CADV 90400-1 | Diode V-101 socket assembly |
| E-134 | P1FFC | SOCKET, TUBE: 7 contact acorn modified; consists of phenolic base, brass bracket with 3 riveted contacts; 1-7/8 in. lg by 27/32 in. w by 5/16 in. thk; used as socket for 3 pins on oscillator tube; CADV 90401-1 | Oscillator V-102 socket assembly |
| E-135 | X1FFC | SOCKET, SPECIAL, TUBE: coaxial cathode and heater contacts part of RF butterfly assembly; grid contact and tube support are part of interstage shield assembly; plate contact is part of mixer butterfly assembly (LISTED FOR REFERENCE ONLY)* | Socket assembly for V-117 |
| E-136 thru E-300 | | Not used | |
| I-101 | P1FFC | LAMP, INCANDESCENT: sig C LM-52; 6-8V 0.15 amp; bulb T-3-1/4 clear; 1-3/16 in. lg overall; miniature bayonet base; C2 filament; burn any position; CG GE-47; CADV 10051 (ND) | RI-FI meter dial illumination |
| J-101 | P1FFC | JACK, TELEPHONE: Navy type (-491957); for 3 cond plug; accommodates PL-68; 1-3/16 in. lg by 3/4 in. dia overall; 3/8 in. mtg hole; CBIM 2J1047A; CADV 10123 | Remote meter receptacle |
| J-102 | P1FFC | JACK, TELEPHONE: Navy type (-49025B); for 2 cond plug; 0.25 in. dia; 1-3/16 in. lg by 3/4 in. h; J1 contact arrangement, mtg bushing 3/8-32 thd by 9/32 in. w/hex mtg nut; 3/8 in. mtg hole; CMA JK-34A; CADV 10122 (ND) | Headphone jack |
| J-103 | | Same as J-102 | Headphone jack |
| J-104 | P1FFC | CONNECTOR, RECEPTACLE: Navy type (- ); 5 round male cont; polarized straight; 7/8 in. OD by 21/64 in. lg less plug prong; cylindrical aluminum body; cadmium plated; standard polychloroprene insert; four 0.120 in. dia mtg holes; 29/32 in. bet mtg/c;7/8-20 NEF-2 thd; CED CA3102E-14S-5P (A-105); CADV-11178 (ND) | Power receptacle |
| J-105 | P1FFC | CONNECTOR, ADAPTER: right angle; male one end, female other end; 1-15/64 in. h by 3/8 in. w by 11/16 in. d; basic internal construction identical to UG-27A/U; one end threaded 5/8-24 thread; cylindrical brass body, silver plated; CPH 82-98; CADV 10661 | Attenuator input |
| J-106 | X2FFC | CONNECTOR, ADAPTER: one round female contact; coaxial type 'N'; straight type; 5/8 in. dia; part of switch S-104 (LISTED FOR REFERENCE ONLY; SEE S-101) | RF output connector at S-104 |
| J-107 | P1FFC | CONNECTOR, RECEPTACLE: one round female contact; coaxial; straight type; 11/16 in. dia by 1-7/8 in. lg; 5/8-24 external thd; basic internal construction similar to UG-19B/U; cylindrical brass body, silver plated; teflon insert; 1 in. sq mtg plate with 4-1/8 in. mtg holes on 23/32 in. mtg centers; CANS KN-1901; CADV 10405 | RF INPUT receptacle |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| J-108 | X2FFC | CONNECTOR, RECEPTACLE: one round female contact; co-axial type 'N'; straight type; 5/8 in. dia; part of switch S-104 (LISTED FOR REFERENCE ONLY; SEE S-104) | Impulse noise calibrator input connector at S-104 |
| L-101 | P1FCC | CHOKE, RF: single pi universal wound; unshielded; 10 microhenries at 7.9 mc test freq; D.C. resistance 2.25 ohms; Q = 20; 7/32 in. OD by 3/64 in. w; phenolic form; 11/32 in. lg by 1/8 in. OD; pigtails 1-17/32 in.; wax impregnated; CADV 10360 | RF choke, V-102 |
| L-102 | | Same as L-101 | Plate RF choke V-101 |
| L-103 | P1FCC | CHOKE, RF: single layer wound; unshielded; 0.28 micro-henries inductance at 7.9 mc test freq; 9/16 in. lg excluding pigtail terminations; wound on standard Allen Bradley 10,000 ohms, 1 w resistor (JAN 30BF103J); 0.562 in. lg by 0.225 in. dia; 1-1/2 in. lg pigtails; CADV 90384-1 | Heater RF choke V-101 |
| L-104 | | Same as L-103 | Heater RF choke V-102 |
| L-105 | | Not used | |
| L-106 | | Not used | |
| L-107 | | Same as L-103 | RF choke at Z-104 |
| L-108 | | Same as L-103 | Heater choke V-103 |
| L-109 | | Same as L-103 | Heater choke V-103 |
| L-110 | | Not used | |
| L-111 | | Same as L-103 | Heater choke V-102 |
| L-112 | | Same as L-101 | RF filter choke V-102 plate |
| L-113 | | Same as L-101 | RF filter choke V-101 plate |
| L-114 | P1FFC | CHOKE, RF: single layer wound; unshielded; 68 micro-henries inductance at 25 mc test freq; 9/16 in. lg excluding terminations; wound on standard Allen-Bradley 75,000 ohms, 1 watt resistor (JAN RC30BF753J); 0.562 in. lg by 0.225 in. dia; 1-1/2 in. lg pigtails; CADV 90705-1 | RF filter choke at CR-102 |
| L-115 | | Not used | |
| L-116 | | Same as L-103 | Heater choke V-117 |
| L-117 | | Same as L-103 | RF filter choke V-117 plate |
| L-118 thru L-121 | | Not used | |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| L-122 | | Same as L-101 | IF filter choke V-110 |
| L-123 | P1FFC | CHOKE, RF: single pi, universal wound; 708 turns No. 38 SNE wire; 38 ohms DC resistance; 1.9 millihenries ±0.1 mh; 13/32 in. dia by 1/2 in. lg excluding terminations, phenolic form 5/32 in. dia by 1/2 in. lg; 2 axial leads 1-1/2 in. lg; Q:25 at 175 kc and 350 kc; CADV 90481-1 | Peaking coil V-114 plate |
| M-101 | P1FFC | METER, MULTI-SCALE: DC; 0-100 microvolts, 0 to 40 db; fan-shaped steel case 4-7/16 in. lg by 3-9/16 in. w by 5-5/8 in. h by 1/2 in. d; plus or minus 1% accuracy for full scale reading; 1500 ohms plus or minus 1% resistance; calibrated for non-magnetic panel; high speed response; black numbers on white background, 100 scale divisions for microvolt scale, 40 scale divisions for db scale, lance type pointer; mts by two binding post term 3/8-24 thd, 7/8 in. lg; CV 269; CADV 10402 | Microvolt and db meter |
| O-101 | P2FFC | GEAR: spur gear; brass; clear lacquer finish; straight teeth; 32 teeth; diametral pitch; 48 pitch; pitch dia 2 in.; 2-3/4 in. OD 120° segment; 1/8 in. thk; straight face; mtd to oscillator gear by three 4-40 screws; CADV 50243 | Internal gear |
| O-102 | P2FFC | GEAR: spur type; 24S-T4 alum; caustic dip finish; straight teeth; 48 teeth; diametral pitch; 48 pitch; pitch dia 0.9962 plus 0.0000 minus 0.0038; 1.0378 plus 0.0000 minus 0.0078 OD; 1/4 in. dia ream; 1/8 in. thk; mtd to shaft w/set screw; CADV 50264 | Pinion mating gear |
| O-103 | P2FFC | GEAR: spur type; 24S-T3 alum; caustic dip finish; straight teeth; 156 teeth; diametral pitch; 48 pitch; pitch dia 3.2462 plus 0.0000 minus 0.0078; 3.2878 plus 0.0000 minus 0.0078 OD; 7/16 in. ream dia; 0.094 thk; straight face; mtd to shaft with retaining ring; CADV 50252 | Dial gear |
| O-104 | P2FFC | GEAR: spur type; 24S-T3 alum; caustic dip finish; straight teeth; 156 teeth; diametral pitch; 48 pitch; pitch dia 3.2462 plus 0.0000 minus 0.0038; 3.2878 plus 0.0000 minus 0.0078 OD; 7/16 in. ream dia by 0.094 thk; straight face; mtd to hub by roll over on the gear; CADV 50242 | Oscillator gear |
| O-105 | P2FFC | GEAR: spur type; 24S-T3 alum; caustic dip finish; straight teeth; 105 teeth; diametral pitch; 48 pitch; pitch dia 2.1837 plus 0.0000 minus 0.0038; 2.2253 plus 0.0000 minus 0.0078 OD; 3/8 in. dia ream; 0.125 in. thk; straight face; mtd to shaft; CADV 50246 | Spring gear |
| O-106 | P2FFC | GEAR: spur type; 24S-T3 aluminum; caustic dip finish; straight teeth; 105 teeth; diametral pitch; 48 pitch; pitch diameter 2.1837 plus 0.0000 minus 0.0038; 2.2253 plus 0.0000 minus 0.0078 OD; 1/4 in. dia drill; 0.064 thk; straight face; mtd to cam by riveting on the gear; CADV 50237 | Trimmer gear |
| O-107 | P2FFC | GEAR: spur type; 24S-T3 aluminum; caustic dip finish; straight teeth; diametral pitch; 48 pitch; pitch diameter 3.2462 plus 0.0000 minus 0.0038; 3.2878 plus 0.0000 minus 0.0078 OD; 21/32 in. ream dia; 0.094 thk; straight face mts to hub; CADV 50239 | Butterfly gear |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| P-101 | P2FFC | CONNECTOR, PLUG: 1 male contact; straight; 3/4 in. OD by 15/16 in. lg overall; cylindrical brass body, silver plated; type N; 50 ohms nominal impedance; textolite insert; CADV 90399-1 | Connects to RF attenuator input |
| P-102 | | Same as P-101 | Connects to S-104 at J-106 |
| P-103 | | Same as P-101* | Connects to S-104 at J-108 |
| R-101 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC30BF150J; 15 ohms; plus or minus 5%; one w; Spec JAN-R-11; CBZ GB-1505; CADV 10012-150 (ND) | Filament dropping for V-101 |
| R-102 | P1FCC | RESISTOR, FIXED, COMPOSITION: JAN type RC32GF123J; 12,000 ohms; ±5%; 1 w; Spec JAN-R-11; CBZ GV8325; CADV 10012-123 (ND)* | Plate current limiting V-117 |
| R-103 thru R-114 | | Not used | |
| R-115 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF100J; 10 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-1005; CADV 10011-100 (ND) | Current limiting to vibrator E-101 |
| R-116 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF103J; 10,000 ohms; ± 5%; 1/2 w; Spec JAN-R-11; CBZ-EB-1035; CADV 10011-103 (ND) | Grid bias, V-103 |
| R-117 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF472J; 4700 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-4725; CADV 10011-472 (ND) | Grid bias, V-102 |
| R-118 | P1FFC | RESISTOR, FIXED, WIRE WOUND: JAN type RW21E502; 5000 ohms; 6 w at 125° max continuous temp oper; body dimen 2 in. lg by 1-1/8 in. thk; enamel coating, resistant to humidity; 2 solder lug term, 3/16 in. w by 7/16 in. lg; mtg bracket 2-3/4 in. mtg/c; Spec JAN-R-26; CAO RW21E502; CADV 10207 (ND) | Plate dropping V-103 |
| R-119 | | Same as R-116 | Grid bias, V-103 |
| R-120 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF181J; 180 ohms; 5%; 1/2 w; Spec JAN-R-11; CBZ EB-1815; CADV 10011-181 (ND) | Cathode bias V-104 |
| R-121 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF473J; 47,000 ohms; 5%; 1/2 w; Spec JAN-R-11; CBZ EB-4735; CADV 10011-473 (ND) | Screen dropping V-104 |
| R-122 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF101J; 100 ohms; 5%; 1/2 w; Spec JAN-R-11; CBZ EB-1015; CADV 10011-101 (ND) | B+ decoupling V-104 |
| R-123 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF680J; 68 ohms; 5%; 1/2 w; Spec JAN-R-11; CBZ EB-6805; CADV 10011-680 (ND) | Cathode bias V-105 |

*(ND) No Stoddart drawing.

TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| RADIO TEST SET AN/URM-17A (Cont'd) | | | |
| R-124 | | Same as R-121 | Screen dropping V-105 |
| R-125 | | Same as R-122 | B+ decoupling at V-105 |
| R-126 thru R-130 | | Not used | |
| R-131 | | Same as R-122 | Cathode bias V-105 |
| R-132 | P1FFC | RESISTOR, VARIABLE, COMPOSITION: 10,000 ohms; plus or minus 10%; 2 w; 100° C max continuous oper; 3 solder lug term; enclosed molded phenolic case; 1-1/16 in. dia by 9/16 in. d; slotted metal shaft 1/4 in. dia by 5/8 in. lg from mtg surface; U taper; insulated contact arm; normal torque; lock-bushing 3/8-32 by 1/2 in. lg, non-turn device located on 17/32 in. radius at 9 o'clock and 3 o'clock; CBZ type J; CADV 10252 (ND) | Attenuator $X10^2$ adjust |
| R-133 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC30BF274J; 270,000 ohms; 5%; 1 w; Spec JAN-R-11; CBZ GB-2745; CADV 10012-274 (ND) | Attenuator $X10^2$ voltage divider |
| R-134 | | Same as R-123 | Cathode bias V-106 |
| R-135 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF330J; 33 ohms; 5%; 1/2 w; Spec JAN-R-11; CBZ EB-3305; CADV 10011-330 | Cathode bias V-106 |
| R-136 | P1FFC | RESISTOR, VARIABLE, COMPOSITION: 10,000 ohms; plus or minus 10%; 2 w; 100° C max continuous operation; 3 solder lug term; enclosed molded phenolic case; 1-1/16 in. dia by 9/16 in. d; round metal shaft; 1/4 in. dia by 3/4 in. lg from mtg surface; U taper; insulated contact arm; normal torque; non-turn device located on 17/32 in. radius at 9 o'clock; CBZ type JU-1031; CADV 10408 (ND) | CAL control |
| R-137 | | Same as R-133 | Voltage divider for CAL control |
| R-138 | | Same as R-121 | Screen dropping V-106 |
| R-139 | | Same as R-122 | B+ decoupling V-106 |
| R-140 | | Same as R-123 | Cathode bias V-107 |
| R-141 thru R-145 | | Not used | |
| R-146 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC30BF222J; 2200 ohms; plus or minus 5%; 1 w; Spec JAN-R-11; CBZ GB-2225; CADV 10012-222 (ND) | Voltage divider for FI-100 control |

*(ND) No Stoddart drawing.

TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| R-147 | P1FFC | RESISTOR, VARIABLE, COMPOSITION: 2500 ohms; plus or minus 10%; 2 w; 100° C max continuous oper; 3 solder lug term; enclosed molded phenolic case 1-1/16 in. lg by 9/16 in. dia; slotted metal shaft 1/4 in. dia by 5/8 in. from mtg surface; U taper; insulated contact arm; normal torque; lockbushing 3/8-32 by 1/2 in. lg; non-turn device located on 17/32 in. radius at 9 o'clock and 3 o'clock; CBZ type J; CADV 10378 (ND) | FI-100 control |
| R-148 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC40BF473J; 47,000 ohms; plus or minus 5%; 2 w; Spec JAN-R-11; COM type little devil; CADV 10377-473 (ND) | Voltage divider for FI-100 control |
| R-149 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF683J; 68,000 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-6835; CADV 10011-683 (ND) | Screen dropping V-107 |
| R-150 | | Same as R-122 | B+ decoupling at V-107 |
| R-151 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF153J; 15,000 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-1535; CADV 10011-153 (ND) | T-105 secondary loading |
| R-152 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF221J; 220 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-2215; CADV 10011-221 (ND) | Cathode bias V-108 |
| R-153 | | Same as R-121 | Screen dropping V-108 |
| R-154 | | Same as R-122 | B+ decoupling at V-108 |
| R-155 | | Same as R-122 | B+ decoupling IF tubes |
| R-156 thru R-160 | | Not used | |
| R-161 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF561J; 560 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-5615; CADV 10011-561 (ND) | Cathode bias V-109 |
| R-162 | | Same as R-151 | T-107 primary loading |
| R-163 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF273J; 27,000 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-2735; CADV 10011-273 (ND) | Screen dropping V-109 |
| R-164 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF102J; 1000 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-1025; CADV 10011-102 (ND) | B+ decoupling at V-109 |
| R-165 | | Not used | |
| R-166 | | Not used | |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| R-167 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF565J; 5.6 megohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-5655; CADV 10011-565 (ND) | Quasi-peak diode load |
| R-168 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC30BF474J; 470,000 ohms; plus or minus 5%; 1 w; Spec JAN-R-11; CBZ GB-4745; CADV 10012-474 (ND) | Voltage divider at V-111 cathode |
| R-169 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF122J; 1200 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-1225; CADV 10011-122 (ND) | Cathode bias V-111 |
| R-170 | | Same as R-136 | PEAK control |
| R-171 thru R-175 | | Not used | |
| R-176 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC40BF20J; 20,000 ohms; 5%; 2 w; Spec JAN-R-11; CBZ HB-2035; CADV 10377-203 (ND) | Voltage divider V-111 screen |
| R-177 | P1FFC | RESISTOR, VARIABLE, COMPOSITION: 50,000 ohms; plus or minus 10%; 2 w; 100° max continuous oper; 3 solder lug term; enclosed molded phenolic case 1-1/16 in. dia by 9/16 in. d; slotted metal shaft 1/4 in. dia by 5/8 in. lg from mtg surface; U taper; insulated contact arm; normal torque; lock-bushing 3/8-32 by 1/2 in. lg; non-turn device located on 17/32 in. radius at 9 o'clock and 3 o'clock; CBZ type J; CADV 10379 (ND) | FI-10 control |
| R-178 | P1FFC | RESISTOR, VARIABLE, COMPOSITION: Navy type (-636059-L10); 1000 ohms; plus or minus 10%; 2 w; 100° C max continuous oper; 3 solder lug term; 1-1/16 in. dia by 9/16 in. d, enclosed body; shaft 1/4 in. dia by 5/8 in. from mtg surface; screw driver slot; U taper; insulated contact arm; normal torque; lock-bushing 3/8-32 by 1/2 in. lg; CBZ type JLU-1021; CADV 10141 (ND) | QP-100 control |
| R-179 | P1FFC | RESISTOR, VARIABLE, COMPOSITION: 5000 ohms; plus or minus 10%; 2 w; 100° C max continuous oper; 3 solder lug term; enclosed molded phenolic case 1-1/16 in. dia by 9/16 in. d; slotted metal shaft 1/4 in. dia by 5/8 in. lg from mtg surface; U taper; insulated contact arm; normal torque; lock-bushing 3/8-32 by 1/2 in. lg; non-turn device located on 17/32 in. radius at 9 o'clock and 3 o'clock; CBZ type J; CADV 10380 (ND) | QP-1 control |
| R-180 | | Same as R-179 | PEAK BUCK control |
| R-181 | | Same as R-179 | FI BUCK control |
| R-182 | | Same as R-133 | B+ dropping for weighting circuits |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| R-183 | P1FFC | RESISTOR, VARIABLE, COMPOSITION: 20,000 ohms; plus or minus 10%; 2 w; 100° C max continuous oper; 3 solder lug term, enclosed molded phenolic case; 1-1/16 in. dia by 9/16 in. d; round metal shaft 1/4 in. dia by 3/4 in. lg from mtg surface; U taper; insulated contact arm; normal torque; non-turn device located on 17/32 in. radius at 9 o'clock and 3 o'clock; CBZ JU-2031; CADV 10409 (ND) | ADJ control |
| R-184 | | Same as R-147 | METER SERIES control |
| R-185 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF152J; 1500 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-1525; CADV 10011-152 (ND) | External meter compensating at J-101 |
| R-186 | | Same as R-164 | B+ filter to V-114 |
| R-187 | | Same as R-185 | Meter compensating |
| R-188 | | Same as R-176 | B+ dropping for ADJ control |
| R-189 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF391J; 390 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-3915; CADV 10011-391 (ND) | Gain equalizing resistor at S-102A |
| R-190 | | Not used | |
| R-191 | | Same as R-115 | I-101 series |
| R-192 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF562J; 5600 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-5625; CADV 10011-562 (ND) | VTVM bias |
| R-193 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF821J; 820 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-8215; CADV 10011-821 (ND) | Cathode bias V-112 |
| R-194 | | Same as R-193 | Cathode bias V-113 |
| R-195 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF223J; 22,000 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-2235; CADV 10011-223 (ND) | VTVM bridge |
| R-196 | | Same as R-132 | ADJ ZERO control |
| R-197 | | Same as R-195 | VTVM bridge |
| R-198 | | Same as R-132 | QP-10 control |
| R-199 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF474J; 470,000 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-4745; CADV 10011-474 (ND) | Grid return V-114 |
| R-200 | | Same as R-189 | Cathode bias V-114 |
| R-201 thru R-205 | | Not used | |

*(ND) No Stoddart drawing.

TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| RADIO TEST SET AN/URM-17A (Cont'd) | | | |
| R-206 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF563J; 56,000 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-563; CADV 10011-563 (ND) | Screen dropping V-114 |
| R-207 | | Same as R-192 | Plate load V-114 |
| R-208 | | Same as R-161 | Cathode bias V-115A |
| R-209 | | Same as R-164 | Plate load V-115A |
| R-210 | | Same as R-121 | Cathode bias V-116 |
| R-211 | | Same as R-164 | Cathode bias V-115B |
| R-212 | | Same as R-199 | Grid return V-115A |
| R-213 | P1FFC | RESISTOR, VARIABLE, COMPOSITION: 1 megohm; plus or minus 10%; 2 w; 100°C max continuous oper; 3 solder lug term; enclosed molded phenolic case; 1-1/16 in. dia by 9/16 in. d; round metal shaft; 1/4 in. dia by 3/4 in. lg from mtg surface; U taper; insulated contact arm; normal torque; non-turn device located on 17/32 in. radius at 9 o'clock and 3 o'clock; CBZ type JU-1051; CADV 10407 (ND) | Audio volume control |
| R-214 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF105J; 1 megohm; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-1055; CADV 10011-105 (ND) | Plate load V-116 |
| S-101 | P1FFC | SWITCH, SENSITIVE: SPDT 1C type contacts; 12 amp 125V or 6 amps 250V AC; molded phenolic body 1-1/64 in. lg by 1-11/32 in. w by 5/16 in. h; stainless steel actuating blade 27/32 in. lg by 3/16 in. w; operating force 3 to 6 oz; release force 2 oz min; movement differential 1/64 in. approx; momentary action; solder lug terms; two 1/8 in. dia eyelets for No. 5 screw; 11/16 in. apart; CATK 1MOBD; CADV 10387 | Attenuator switch |
| S-102A, B,C,D, E | P1FFC | SWITCH, ROTARY: sectional type; 5 sections; silver plated brass contacts; phenolic; 1-7/16 in. lg from mtg surface by 1-5/16 in. h by 1-1/4 in. dia; non-shorting type contacts; solder lug terminals; single hole mtg bushing 3/8 in. lg by 3/8 in. dia; COC type F; CADV 10384 | Function switch |
| S-103A, B,C | P1FFC | SWITCH, ROTARY: sectional type; 1 section; silver plated brass contacts; phenolic; 1-9/16 in. lg by 1-5/16 in. h by 1-1/4 in. dia; shorting type contacts; solder lug terminals; single hole mtg; bushing 3/8 in. lg by 3/8 in. dia; COC type F; CADV 10385 | Pulse stretcher and noise source on-off |
| S-104 | P1FFC | SWITCH, COAXIAL: includes J-106 and J-108 which are integral and non-replaceable parts of this switch; 1-9/16 in. lg by 1-5/16 in. h by 49/64 in. thk; CADV 90801-1 | Coaxial switch |
| T-101 | P1FFC | COIL, RF: 60 mc; IF input; unshielded; 19/32 in. dia by 1-5/16 in. lg; steatite form with silver plated copper core and mtg bushing; slug tuned; mounting bushing on coil form threaded 5/16-24 NF for mounting thru hole in chassis; 9 turns No. 25E wire close wound; tapped at 3rd turn; 3 wire leads; CADV 90376-1 | Input IF transformer |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| T-102 | P1FFC | TRANSFORMER, IF: 60 mc; 1st IF; unshielded; 19/32 in. dia by 1-5/16 in. lg; steatite form with silver plated copper core; slug tuned; mounting bushing on coil form threaded 5/16-24 NF for mounting thru hole in chassis; primary 9-1/2 turns No. 25E wire; secondary 3 turns No. 25E wire; solenoid wound; 4 wire leads; CADV 90377-1 | Interstage IF transformer |
| T-103 | P1FFC | TRANSFORMER, IF: 60 mc; 2nd IF; unshielded; 19/32 in. dia by 1-5/16 in. lg; steatite form with silver plated copper core; slug tuned; mounting bushing on coil form threaded 5/16-24 NF for mounting thru hole in chassis; primary 9-1/2 turns 25E wire; secondary 4 turns 25E wire; solenoid wound; 4 wire leads; CADV 90377-2 | Interstage IF transformer |
| T-104 | P1FFC | TRANSFORMER, IF: 60 mc; 3rd IF; unshielded; 19/32 in. dia by 1-5/16 in. lg; steatite form with silver plated copper core; slug tuned; mounting bushing on coil form threaded 5/16-24 NF for mounting thru hole in chassis; primary 9-1/2 turns No. 25E wire; secondary 5 turns No. 25E wire; solenoid wound; 4 wire leads; CADV 90377-3 | Interstage IF transformer |
| T-105 | P1FFC | TRANSFORMER, IF: 60 mc; 4th IF; unshielded; 19/32 in. dia by 1-5/16 in. lg; steatite form with silver plated copper core; slug tuned; mounting bushing on coil form threaded 5/16-24 NF for mounting thru hole in chassis; primary 8-1/2 turns No. 25E wire; secondary 5 turns No. 25E wire; solenoid wound; 4 wire leads; CADV 90377-4 | Interstage IF transformer |
| T-106 | | Same as T-105 | Interstage IF transformer |
| T-107 | P1FFC | TRANSFORMER, IF: 60 mc; 6th IF; unshielded; 19/32 in. dia by 1-5/16 in. lg; steatite form with silver plated copper core; slug tuned; mounting bushing on coil form threaded 5/16-24 NF for mounting thru hole in chassis; primary 6 turns No. 25E wire; secondary 5 turns No. 25E wire; solenoid wound; 4 wire leads; CADV 90377-5 | IF output transformer to detector |
| T-108 | P1FFC | TRANSFORMER, AF: Navy type (-304878); plate coupling type; primary 10,000 ohms impedance; secondary 600 ohms impedance; primary 5 ma DC; 1-1/4 in. sq by 1-3/4 in. lg; max audio level 100 milliwatts; turns ratio of primary to 1/2 secondary 3.75:1; frequency response 100 to 3000 cycles plus or minus 2 db; electrostatic shield between primary and secondary; 4 solder lug terms equi-distantly spaced on bottom of transformer; mts by two 6-32 by 1/4 inserts; CADV 10128 | Audio output |
| V-101 | P1FFC | TUBE, ELECTRON: JAN-9005; U. H. F. diode; CADV 9005 (ND) | Calibrating diode |
| V-102 | P1FFC | TUBE, ELECTRON: JAN-6F4; oscillator triode, CADV 6F4 (ND) | Calibrating oscillator |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| V-103 | | Same as V-102 | Local oscillator |
| V-104 | P1FFC | TUBE, ELECTRON: JAN-6BH6, sharp-cutoff pentode; CADV 6BH6 (ND) | First IF amplifier |
| V-105 | | Same as V-104 | Second IF amplifier |
| V-106 | | Same as V-104 | Third IF amplifier |
| V-107 | | Same as V-104 | Fourth IF amplifier |
| V-108 | | Same as V-104 | Fifth IF amplifier |
| V-109 | P1FFC | TUBE, ELECTRON: JAN-6AR5; power pentode; CADV 6AR5 (ND) | Sixth IF amplifier |
| V-110 | P1FFC | TUBE, ELECTRON: JAN-5726/6AL5; duodiode; CADV 5726/6AL5 (ND) | Detector |
| V-111 | | Same as V104 | AVC amplifier |
| V-112 | P1FFC | TUBE, ELECTRON: JAN-6135/6C4; high frequency power triode; CADV 6135/6C4 (ND) | VTVM |
| V-113 | | Same as V-112 | VTVM |
| V-114 | | Same as V-104 | First audio amplifier |
| V-115 | P1FFC | TUBE, ELECTRON: JAN-5814/12AU7; twin triode amplifier; CADV 5814/12AU7 (ND) | Audio amplifier |
| V-116 | | Same as V-110 | Pulse stretcher |
| V-117 | P1FFC | TUBE, ELECTRON: GL-6299; planar triode CADV GL-6299 (ND) | RF amplifier |
| XI-101 | P1FFC | LIGHT, INDICATOR: with lens; 1/2 in. dia red dia cut lens; for miniature bayonet base; T-3-1/4 bulb; 6-8 V, 0.15 amp; open frame; chrome plated steel; 2-5/32 in. lg by 1 in. h by 7/8 in. w overall; 11/16 in. dia mtg. hole required; 15/64 in. max panel thk; horizontally mtd socket lamp; replaceable from front of panel; threaded jewel; 2 solder lug term located 30° apart on base of socket; CAYS 40; CADV 10115 | Dial light |
| XV-101 thru XV-103 | | Not used | |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| XV-104 | P1FFC | SOCKET, ELECTRON TUBE: 7 contacts miniature; JAN type TSE7-T102; one piece saddle mounting sub-chassis; 2-1/8 in. dia mtg holes on 7/8 in. mtg/c, 5/8 in. dia chassis cutout required; round ceramic body, 1-3/32 in. by 13/16 in. overall dia; phosphor bronze cadmium plated contacts; unmarked; steel shield 3/32 in. dia; Spec JAN-S-28A; CEB 7676; CADV 10118 (ND) | Socket for V-104 |
| XV-105 | | Same as XV-104 | Socket for V-105 |
| XV-106 | | Same as XV-104 | Socket for V-106 |
| XV-107 | | Same as XV-104 | Socket for V-107 |
| XV-108 | | Same as XV-104 | Socket for V-108 |
| XV-109 | | Same as XV-104 | Socket for V-109 |
| XV-110 | | Same as XV-104 | Socket for V-110 |
| XV-111 | | Same as XV-104 | Socket for V-111 |
| XV-112 | | Same as XV-104 | Socket for V-112 |
| XV-113 | | Same as XV-104 | Socket for V-113 |
| XV-114 | | Same as XV-104 | Socket for V-114 |
| XV-115 | P1FFC | SOCKET, ELECTRON TUBE: 9 contacts miniature; JAN type TSE9-T102; one piece saddle mounting, sub-chassis; two 1/8 in. dia mtg holes on 1-1/8 in. mtg/c; 3/4 in. dia chassis cutout required; round ceramic body, 1-3/16 in. by 15/16 in. dia overall; beryllium-copper silver plated contacts; Spec JAN-S-28A; CMG 53F13381; CADV 10036 | Socket for V-115 |
| XV-116 | | Same as XV-104 | Socket for V-116 |
| Z-101 | X1FFC | FILTER, LOW-PASS: 1000 mc cutoff frequency; 3/8 in. dia by 7-7/8 in. lg; input and output impedance matched, 52 ohms; brass silver plated case; clamped to chassis with cable clamp; no terminals; connections to input and output formed by RG-58A/U cable permanently a part of filter; ultra-high frequency coaxial filter using sections of coaxial line having large impedance with respect to 52 ohms as inductance elements and sections of coaxial line having small impedance with respect to 52 ohms used as capacitance elements; consists of 5 constant K sections including matching input and matching output sections; CADV 90378-1 | RF low-pass filter |
| Z-102 | P2FFC | TUNER, RF: sub-assembly; RF butterfly tuning element; 4 stator plates (CADV pt/dwg 50223) and three rotar plates (CADV pt/dwg 50225); tunes over the frequency range 375 mc to 1000 mc; stator plate circular with butterfly shaped cutout; 4-11/16 in. lg by 2-5/8 in. dia; 3 clearance holes for No. 6 screws on blank radius spaced 120° apart; tuning element mtd on ceramic standoff spaces fastened to bearings spaced approximately 11/16 in. apart to support rotor shaft; multi-contact spring washer provides electrical contact between rotor shaft and bearing housing; CADV 90354-1 | First RF tuned circuit |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| Z-102A | AFFR | TUNING UNIT SUB-ASSEMBLY: consists of coaxial heater-cathode contacts and mounting bracket for V-117 bolted to RF tuner mounting stud; CADV 91489-1 (ND) | Heater-cathode contacts for V-117 |
| Z-103 | P2FFR | TUNER, RF: sub-assembly; mixer butterfly tuning element; 3 stator plates (CADV pt/dwg 50223) and 1 stator plate (CADV pt/dwg 50232) and 3 rotor plates (CADV pt/dwg 50225); tunes over frequency range 375 mc to 1000 mc; stator plate circular with butterfly shaped cutout; 5-1/16 in. lg by 2-5/8 in. dia; 3 clearance holes for No. 6 screws on blank radius spaced 120° apart; tuning element mtd on ceramic standoff spacers fastened to bearing housing; bearing housing contains 2 bearings spaced approximately 11/16 in. apart to support rotor shaft; multi-contact spring washer provides electrical contact between rotor shaft and bearing housing; CADV 90355-1 | Mixer tuned circuit |
| Z-103A | P2FFR | TUNING UNIT SUB-ASSEMBLY: consists of rear stator plate and crystal holder; 2-3/8 in. dia. by 21/32 in. thk; CADV 90396-1 | Mixer rear stator |
| Z-103B | X1FFC | TUNING UNIT SUB-ASSEMBLY: consists of cylindrical plate contact for V-117 and mounting bracket bolted to mixer butterfly mounting stud (LISTED FOR REFERENCE ONLY) | Plate contact for V-117 |
| Z-104 | X1FFC | TUNER, RF: sub-assembly; oscillator butterfly tuning element; 3 stator plates (CADV pt/dwg 50223) and one stator plate (CADV pt/dwg 50224) and 3 rotor plates (CADV pt/dwg 50225); tunes over the frequency range of 315 mc to 940 mc; stator plate circular with butterfly shaped cutout; 4-1/2 in. lg by 2-5/8 in. dia; 3 clearance holes for No. 6 screws on blank radius spaced 120° apart; tuning element mtd on ceramic standoff spacers fastened to bearing housing; bearing housing contains 2 bearings spaced approximately 11/16 in. apart to support rotor shaft; multi-contact spring washer provides electrical contact between rotor shaft and bearing housing; CADV 90356-1 | Local oscillator tuned circuit |
| Z-104A | P2FFC | TUNING UNIT SUB-ASSEMBLY: consists of stator plate, phenolic base with three tube contacts, one resistor (R-119) and two choke assemblies (L-108, L-109); 2-3/8 in. lg by 2-1/2 in. w by 1-5/8 in. h; CADV 90357-1 | Rear stator plate oscillator |
| Z-105 | AFFR | TRANSMISSION LINE: calibrating oscillator; consists of grid line and plate line assemblies; also includes C-104; composed of mechanical parts only (LISTED FOR REFERENCE ONLY) | Resonant circuit for calibrating oscillator |
| Z-106 | P1FFC | FILTER, LOW-PASS: 2.7 mc cutoff frequency; input and output unmatched; 1 input 1 output terminals; solder lug type; sealed; pi network consisting of 2 1500 mmf shunt capacitors and 1 10 microhenries series inductance; will handle 150 ma DC; hot tin dipped rectangular steel case 1-3/4 in. lg by 1 in. w by 3/4 in. h; 2 4-40 tapped mtg holes on bottom spaced 1 in. by 1/2 in. (diagonally); CADV 90379-1) | IF filter at V-105 |
| Z-107 | | Same as Z-106 | IF filter at V-106 |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| Z-108 | P1FFC | FILTER ASSEMBLY: contains 2 identical low-pass filters; includes 2 pi filter networks each consisting of 2 1500 mmf shunt capacitors and 1 10 microhenries series inductance; will handle 150 ma DC; case marked with mfrs pt 90380-1; hot tin dipped steel case; rectangular shape; 1-3/4 in. lg by 1 in. w by 3/4 in. h; 2 4-40 tapped mtg holes on bottom spaced 1 in. apart; CADV 90380-1 | IF filter at V-107 grid and cathode |
| Z-109 | | Same as Z-106 | IF filter at V-108 cathode |
| Z-110 | P1FFC | FILTER ASSEMBLY: contains 1 band suppression filter and 1 low-pass filter; a) band suppression filter consists of series inductance tuned to 60 mc and input and output shunt capacity of 1500 mmf each; input and output impedance not matched; will handle 3 amp AC; b) low-pass filter consists of pi network composed of 2 1500 mmf shunt capacitors and 1 10 microhenries series inductance; will handle 150 ma DC; case marked with mfrs part 90381-1; hot tin dipped steel case; rectangular shape; 1-3/4 in. lg by 1 in. w by 3/4 in. h; 2 4-40 tapped mtg holes on bottom spaced 1 in. apart; sealed; CADV 90381-1 | IF filter heater and plate supplies to IF tubes |
| Z-111 | | Same as Z-106 | IF filter |
| Z-112 | P1FFC | FILTER, BAND SUPPRESSION: suppresses frequencies from 50 to 70 mc; input and output unmatched; hot tin dipped rectangular steel case 1-3/4 in. lg by 1 in. w by 3/4 in. h; 2-5/8 in. lg overall; 2 4-40 tapped mtg holes on bottom spaced 1 in. apart; 1 input and 3 output solder lug term; sealed; consists of network tuned to reject 60 mc with 10 mmf shunt capacitors on input and output; assembly also contains a 5.6 megohm 1/2 watt resistor, a 10,000 ohm 1/2 watt resistor, a 0.01 mfd series capacitor and 2 1500 mmf shunt capacitors; CADV 90382-1 | IF filter, AVC filter and diode load |
| Z-113 | P1FFC | FILTER, BAND SUPPRESSION: peak frequency 60 mc; bandwidth 12 mc; 9/16 in. lg by 9/32 in. dia less wire leads; input and output impedance 7000 ohms; uncased; 2 axial wire leads 1-1/2 in. lg each; coil wnd on 22 mmf cap; connected in parallel; CADV 90385-1 | Feedback filter at V-104 heater |
| Z-114 | | Same as Z-113 | Feedback filter at V-105 heater |
| Z-115 | | Same as Z-113 | Feedback filter at V-106 heater |
| Z-116 | | Same as Z-113 | Feedback filter at V-107 heater |
| Z-117 | | Same as Z-113 | Feedback filter at V-108 heater |
| Z-118 | | Same as Z-113 | Feedback filter at V-109 heater |
| Z-119 | | Not used | |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| Z-120 | AFFC | ATTENUATOR, RADIO FREQUENCY: consists of attenuator pads E-115, E-116, E-117, E-119 and E-120, connector J-105, switch S-104 and miscellaneous structural components; CADV 90802-1 (LISTED FOR REFERENCE ONLY) | RF attenuator |
| 300 thru 399 | AFFR | POWER SUPPLY: Navy type PP-530A/URM-17; operates from 105 to 125 or 210 to 250 volts AC, 50 to 1600 cycles-per-second; power consumption 115 watts at 115 volts, 60 cps; power factor 0.935 at 115 volts, 60 cps; output 225 v dc at 100 ma, -17 v at 7 ma, 6.3 v AC at 4 amps; overall dimensions 10-1/2 in. lg by 8-3/8 in. d by 7-17/32 in. h (including carrying handle); CADV 90329-5 (ND) | Power supply for 1M52A/URM-17 |
| C-301 | P1FFC | CAPACITOR, FIXED, PAPER DIELECTRIC: JAN type CP65BLEE105V; 1.0 mfd, 400 VDCW, metal case; 2-1/2 in. h by 1-5/16 in. w by 49/64 in. d; Spec JAN-C-25; CD CP65BLEE105V; CADV 10359 (ND) | Power supply regulator filter |
| C-302 | P1FFC | CAPACITOR, FIXED, ELECTROLYTIC: JAN type CE41C900Q; round metal can; 90 mfd; 400 VDCW; 4-1/4 in. lg by 1-3/8 in. dia; Spec JAN-C-62; CSF V7242; CADV 10382 (ND) | Power supply B+ filter |
| C-303 | | Same as C302 | Power supply B+ filter |
| C-304 | P1FFC | CAPACITOR, FIXED, CERAMIC DIELECTRIC: disc type; 20,000 mmf; 600 vdcw; tolerance GMV; 19/32 in. dia; 0.160 in. thk; color, red; marked 'ER' and '0.02'; 2 radial wire leads 1-3/4 in. lg; similar to CER 817; CADV 10493 | Filter for V-303 |
| E-301 | P1FFC | POST, BINDING: screw type 15/16 in. lg by 1/2 in. dia overall; no stud; 0.1640 in. dia hole by 3/16 in. d, 8-32 thd; brass nickel pl; 1/8 in. by 5/32 in. wire hole; adjustable; max opening 5/32 in.; locating shoulder; CEB 6604; CADV 10171 | Ground post for power supply |
| E-302 | | Same as E-105 | Shield for V-302 |
| E-303 | X2FFC | CONNECTOR: adapter; 3 pin receptacle one end; 2 pin plug other end; with pigtail ground leads; p/o W402; CADV 10957, low failure item 1 required, requisition from ESO referencing NAV SHIPS 900-180; (ND) | Adapts 3 pin cable to 2 pin sockets |
| F-301 | P1FFC | FUSE, CARTRIDGE: Navy type (-28032-2); 2 amps at 250 v; one time; glass body; ferrule; 1-1/4 in. lg by 1/4 in. dia; CLF AG-31202; CADV 10411 (ND) | AC line fuse |
| F-302 | | Same as F-301 | AC line fuse |
| F-303 | | Same as F-301 | Spare fuse |
| F-304 | | Same as F-301 | Spare fuse |
| H-301 | P1FFC | FASTENER, SNAP: snapslide tube; stainless steel; 1-1/2 in. OD by 1-3/8 in. ID by 7/8 in. thk overall; mts by 10-32 machine screw; buckle type lock opposite mtg foot and tension loop; CAIS 926C; CADV 10271 (ND) | Clamp for R301 |
| H-302 | | Same as H-301 | Clamp for V-301 |

*(ND) No Stoddart drawing.

TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| RADIO TEST SET AN/URM-17A (Cont'd) | | | |
| H-303 | P1FFC | CLAMP, CABLE: aluminum; clear lacquer finish; 2 fillister head machine screws; 27/32 in. lg by 13/64 in. dia; accommodates cable up to 5/16 in. dia; Army-Navy type dwg AN-3057-6; CED 2255-3; CADV 10096 (ND) | Cable clamp on P-301 |
| I-301 | | Same as I-101 | POWER ON indicator |
| J-301 | P2FFC | CONNECTOR, RECEPTACLE: Navy type (- ); 5 round female cont; polarized; straight; 7/8" OD by 21/64" lg; cylindrical; aluminum body; cadmium plated; standard polychloroprene insert; four 0.120" dia mtg holes; 29/32" bet mtg/c; 7/8-20 NEF-2 thd; CED-3102E-14S-5S (A-105); CADV-11179 (ND) | POWER OUTPUT receptacle |
| J-302 | P2FFC | CONNECTOR, RECEPTACLE: Navy type (- ); 3 round male cont, polarized; straight; 7/8" OD by 21/64 lg less plug prong; cylindrical aluminum body cadmium plated; standard polychloroprene insert; four 0.120" dia mtg holes; 29/32" bet mtg/c; 7/8-20 NEF-2 thd; CED-3102E-14S-7P (A-105); CADV 11180 (ND) | POWER INPUT receptacle |
| P-301 | P2FFC | CONNECTOR, PLUG: AN type AN-3106E-14S-7S; 3 round female contacts; polarized; on one end of W-301; CADV 11136 | W-301 connector |
| P-302 | X2FFC | CONNECTOR, PLUG: 3 pin type; 2 flat contacts and one "U" shape contact; molded into and part of CADV 10944 (ND) | W-301 connector |
| P-303 | P1FFC | CONNECTOR, PLUG: Navy type (- ) 5 round male cont; polarized; straight; 0.906" OD by 1.703: lg overall; cylindrical body; aluminum, cadmium plated; knurled coupling nut 1.109" OD; 7/8-20 NEF-2 thd; polychloroprene insert; CED-CA3106F-14S-5 S (A-105): CADV 11177 (ND) | W-302 connector |
| P-304 | P1FFC | CONNECTOR, PLUG: Navy type (- ) 5 round female cont; polarized; straight; 0.906" OD by 1.703" lg overall; cylindrical aluminum body cadmium plated; knurled coupling nut 1.109" OD; 7/8-20 NEF-2 thd; polychloroprene insert; CED-CA3106F-14S-5S(A-105); CADV 11176 (ND) | W-302 connector |
| R-301 | P1FFC | RESISTOR, THERMAL: 3.4 to 5.1 v; 3.4 to 3.6 amp; AC and DC operation; ST-14 bulb, 4-11/16 in. lg overall; octal base; base wiring; prongs 2 and 3 1st terminal, prongs 7 and 8 2nd terminal; Pioneer Electronics Corp. CR-3500-3; CADV 10355 | Current limiter |
| R-302 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF120J; 12 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-1205; CADV 10011-120 (ND) | I-301 pilot lamp current limiting |
| R-303 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20GF393J; 39,000 ohms; ±5%; 1/2 w; Spec JAN-R-11; CBZ-EB-3935; CADV 10011-393 (ND) | Grid current equalizing V-301 |
| R-304 | P1FFC | RESISTOR, FIXED, COMPOSITION: Jan type RC20BF823J; 82,000 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-8235; CADV 10011-823 (ND) | Plate load of V-302 |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| R-305 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC20BF333J; 33,000 ohms; plus or minus 5%; 1/2 w; Spec JAN-R-11; CBZ EB-3355; CADV 10011-333 (ND) | Voltage divider screen supply of V-302 |
| R-306 | | Same as R-206 | Voltage divider screen supply of V-302 |
| R-307 | | Same as R-195 | Voltage divider bias of V-302 |
| R-308 | | Same as R-179 | REGULATOR ADJ |
| R-309 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC30BF393J; 39,000 ohms; plus or minus 5%; 1 w; Spec JAN-R-11; CBZ GB-393J; CADV 10012-393 (ND) | Voltage divider bias of V-302 |
| R-310 | P1FFC | RESISTOR, FIXED, COMPOSITION: JAN type RC40BF331J; 330 ohms; plus or minus 5%; 2 w; Spec JAN-R-11; COM type little devil; CADV 10377-331 (ND) | Filter resistor |
| R-311 | | Same as R-310 | Filter resistor |
| R-312 | | Same as R-310 | Filter resistor |
| R-313 | | Same as R-310 | Filter resistor |
| R-314 | | Not used | |
| R-315 | | Same as R303 | Grid current equalizing V-301 |
| R-316 | P1FFC | RESISTOR, FIXED, WIREWOUND: 7 ohms; ±5%, 5 w; 7/8 in. lg less leads; 5/16 in. dia; 1 axial lead each end 2 in. lg; silicone sealed; Dale Products Co. Inc. RS-5-7; CADV 11181 (ND) | Heater voltage adjust limit |
| R-317 | P1FFC | RESISTOR, VARIABLE, WIREWOUND: 15 ohms; ±5%; 3 w; 3 solder lug terminals; bakelite casing; cover dust resisting, keyed to casing; 1-23/32 in. dia by 13/16 in. d; slotted metal shaft 1/4 in. dia; S taper; one piece contact arm and collector; normal torque; lock bushing 3/8-32 by 3/8 in. lg; non-turn device located at 17/32 in. at 9 o'clock; Spec MIL-R-19; Clarostat Mfg Co. Inc. 58C2-15; CADV 11182 (ND) | Heater voltage adjust |
| S-301 | P1FFC | SWITCH, TOGGLE: Navy type (-24003); DPDT; 125 v at 3 amp, 250 v at 1 amp; body black nickel finish, handle, bushing and hardware bright nickel finish; bat type handle 9/16 in. lg; overall dim 1-3/8 in. lg by 1/2 in. w by 9/16 in. h; single hole bushing; 15-32 thd, 15/32 in. lg; silver plated contacts; CHH 20905GH; CADV 10172 | POWER ON-OFF |
| S-302 | | Same as S-301 | Power input selector |
| T-301 | P1FFC | TRANSFORMER, POWER: filament and plate type; two primaries 115 to 230V ea; secondary 1 640 V at 0.1 amp, secondary 2 11.5 V at 3.5 amp, secondary 3 6.3 V at 2.65 amp; 3-1/2 in. lg by 4-3/4 in. h; hermetically sealed metal case; mtd by 4-10/32 blind tapped holes; 11 terminals CBGM 4826; CADV 10386 | Power transformer |

*(ND) No Stoddart drawing.

TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| V-301 | P1FFC | TUBE, ELECTRON: JAN-6080WA/6AS7G; low-mu power triode; CADV 6080WA/6AS7G | Rectifier regulator |
| V-302 | | Same as V-104 | Regulator control |
| V-303 | P1FFC | TUBE, ELECTRON: JAN type 5651; CADV 5651 | Bias regulator |
| W-301 | P2FFC | CABLE ASSEMBLY, POWER: Army-Navy type CX-3810/U (6'6"); power type; 3 conductors; neoprene covered; has P-302 and E-303 on one end, P-301 on other end; 6 ft 5-9/16 in. lg overall; CADV 91258-1 | Power cable |
| W-302 | P2FFC | CABLE ASSEMBLY: special purpose; 10'0"; cable consists of five conductors 16 AWG stranded; conductors made up of 19 strands of 29 AWG tinned copper; insulation of each conductor is extruded thermoplastic with outer jacket of nylon; rated 600 vac rms; all conductors are enclosed in flexible shielding conduit; conduit is covered with thin wall of rubber; 10 ft lg overall; conduit assembly at each end form part of cable; P303 attached to conduit assembly at one end; P-304 attached to conduit assembly at other end; CADV-91487 | Power supply cable |
| XF301 | P1FFC | HOLDER, FUSE: extractor post type; holds a 3 AG cartridge fuse; 1/8 in. thk bakelite case with brass retainer; 250 v; 15 amp; 2-1/2 in. lg by 3/4 in. dia; 1/2 in. dia thrd body for panel hole mtg; 2 solder lug term, one on end, one on side; CLF 3410-01; CADV 10331 | Fuse holder for F-301 |
| XF-302 | | Same as XF-301 | Fuse holder for F-302 |
| XF-303 | | Same as XF-301 | Fuse holder for F-303 |
| XF-304 | | Same as XF-301 | Fuse holder for F-304 |
| XI-301 | | Same as XI-101 | Socket for I-301 |
| XV-301 | P1FFC | SOCKET, TUBE: Navy type 49395; 8 contact octal; one piece steel mtg plate molded in body; two 0.095 in. dia mtg holes on 1-1/2 in. mtg/c; round phenolic body; 1-1/4 in. dia by 1/2 in. h excluding term; phosphor-bronze silver plated contacts; unmarked; CMG 9857; CADV 10197 (ND) | Socket for V-301 |
| XV-302 | | Same as XV-104 | Socket for V-302 |
| XV-303 | | Same as XV-301 | Socket for R-301 |
| XV-304 | | Same as XV-104 | Socket for V-303 |
| Z-301 | P1FFC | FILTER ASSEMBLY: contains 2 identical low-pass filters; hot tin dipped steel case; included 2 pi filter networks each consisting of two 1500 mmf feed-thru capacitors and one RF choke assembly (CADV pt/dwg 90384-1); CADV 90386-1 | RF filter |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| 400-499 | | ACCESSORIES | |
| A-401 | P2FFC | TRIPOD: Navy type (-10545) for dipole antenna; collapsible type; 37-1/2 in. lg collapsed; 60 in. lg extended; wooden legs; aluminum head with aluminum socket for dipole mast; includes wing nut locking devices for legs; reversible legs; spike or rubber feet; CADV 90310-2 | Mounts dipole antenna and antenna mast section |
| A-402 | P2FFC | MAST SECTION: antenna; Army-Navy Mast Section AB-363/U; one piece construction; straight grain eastern maple; phenolic varnish finished; for tripod mtg; portable; no markings; principle parts consist of mast, connecting tube and rosin; provides support for dipole antenna head assembly; dia at base 27/32 in., dia at top 1 in., height 36-1/8 in.; CADV 90920-1 | Mounts dipole antenna |
| A-403 | P2FFC | INDICATOR, AZIMUTH: used with Army-Navy Antenna Mast Section AB-189/URM-17; aluminum, black lacquer finish; 3 in. lg by 2-1/4 in. dia; with 1 in. dia hole thru center; single knurled lock screw; longitudinal leaf tension spring riveted to inner wall; aluminum compass rose screwed to top by two 2-56 screws; compass rose calibrated 360 degrees, numbered at 10-degree intervals; two aluminum sighting pins 1/2 in. lg by 1/8 in. dia at 0-degree and 180-degree positions; CADV 90044-1 | Indicates orientation dipole antenna |
| A-404 | P2FFC | KNOB: used with Army-Navy Antenna Mast Section AB-189/URM-17; truncated cone shape; 2 in. dia by approx 3/4 in. h with 1 in. dia hole thru center counterbored 1-1/8 in.; includes circular spring clamp in base; double 8-32 set screws marked with index line on side from top to bottom; CADV 90045-1 | Bearing marker for dipole antenna |
| E-401 | P2FFC | PROBE, RF: Army-Navy RF Probe DT-194/URM-17A; consists of series connected tubular ceramic film capacitor 15,000 mmf ± 20%, 1,000 volts AC or DC; mtd in housing between two special 50 ohm rf connectors, one at each end; 2-7/8 in. lg by 3/4 in. dia; CADV 91477-2 (ND) | For interference pickup |
| E-402 | | Not used | |
| E-403 | AFFR Low failure item. If required requisition from ESO referencing NAVSHIPS 900, 180A | ANTENNA: Army-Navy Antenna AT-792/URM-17A; dipole; 375 to 1000 mc frequency range; 52 ohms input impedance; matching transformer part of unit; mounts on tripod or antenna mast section AB-363/U; 3 sets adjustable element pairs, 5-5/8 in. lg, 3-7/8 in. lg, 2-5/32 in. lg all 1/4 in. dia; 7/8 O.D. at churck clamp; 16 in. lg extended; 5-1/2 in. lg collapsed; 13-15/16 in. h; CADV 90330-4 | Used for radiation measurements |

*(ND) No Stoddart drawing.

## TABLE 8-1. MAINTENANCE PARTS LIST

| Reference Symbol | Notes | Name and Description | Locating Function |
|---|---|---|---|
| | | RADIO TEST SET AN/URM-17A (Cont'd) | |
| J-401 | P2FFC | CONNECTOR, RECEPTACLE; RF; single round female contact; straight type; 0.855 in. lg by 5/8 in. dia; cylindrical shape; brass silver plated; 52 ohms nominal impedance; polystyrene insert; synthetic rubber insert; external and threaded 5/8-24 thd; similar to UG-58/U except that mounting plate has been removed; CADV 90475-1 | Receptacle on Antenna AT-255/ URM-17 |
| J-402 | | CONNECTOR RECEPTACLE, ELECTRICAL: 3rd male contacts; polarized straight; 0.656 in. OD by 29/32 in. lg less term; cylindrical aluminum body; melamine insert; 11/16 in. mtg hole; mts by four 0.120 in. dia holes on 23/32 in. C to C; AN type AN3102-10SL-3P; CED 2054-3; CADV 10042 (ND) | Remote meter connector |
| M-401 | | Meter, MULTI-SCALE: AN type ME-131/U; dc; 0-100 uv; 0 to 40 db; fan-shaped; steel case; 3-7/8 in. h by 3-7/8 in. d. by 5-25/32 in. lg overall dim, portable type; meter same as M-101, mts J-402, CADV 9078-9 | Remote meter assembly |
| P-401 | P1FFC | CONNECTOR, PLUG: RF; Army-Navy Plug UG-21A/U; Navy Spec RE 49F402; 1 male contact; straight type; brass silver plated; 3/4 in. OD by 1-3/4 in. lg overall; coax, weatherproof, type N; 52 ohms nominal impedance; CANS UG-21D/U; CADV 10701 (ND) | W-401 Connector |
| P-402 | | Same as P-401 | |
| P-403 | | PLUG, TELEPHONE: 3 cond; single shank; tubular black fibre shell; shank 13/64 in. dia by 1-3/32 in. lg; shell 1/2 in. dia; 3-1/4 in. lg overall; CRL PJ-068B; CADV 10088 (ND) | P/o remote meter cable assembly |
| P-404 | | CONNECTOR PLUG, ELECTRICAL: 3rd female contacts; polarized; straight; 7/8 in. dia by 1-1/2 in. lg overall dim.; 5/8-24 coupling nut; cylindrical aluminum body; melamine inserts; AN type AN-3106-10SL-3S; CED 2072-4; CADV 10069 (ND) | P/o remote meter cable assembly |
| P-405 | | PLUG, TELEPHONE: JAN type PJ-055B; 2 conductors; single shank; tubular, black, molded cellulose acetate shell; shank 1/4 in. dia by 1-7/32 in. lg; 1/2 in. dia shell; 2-27/32 in. lg overall dim.; CRL PJ-055B; CADV 10089 (ND) | P/o headphone extension cable assembly |
| P-406 | | JACK, TELEPHONE: Navy type 49929; for 2 conductor plug, 1/4 in. dia; overall dim., 11/16 in. dia by 3-3/8 in. lg; contact arrangement J1-1A; 1/4 in. dia cable opening; CMA 100A; CADV 10087 | P/o headphone extension cable assembly |
| W-401 | X1FFC | CABLE ASSEMBLY, RADIO FREQUENCY; RF transmission line; Army-Navy rf cable assembly CG-9D/U (20'0"); RG-8/U cable; 20 ft. lg including terminations; has P-401 one end; P-402 other end (assemble from component parts); CADV 90933-5 | RF transmission line for connection to RF INPUT receptacle |
| W-402 | | CABLE ASSEMBLY, SPECIAL PURPOSE: AN type CG-571/U (20' 0") RG-108/U cable; 20 ft lg excluding term; incl P-403 one end, P-404 other end; CADV 90075-2 | Remote meter cable assembly |
| W-403 | | CABLE ASSEMBLY, SPECIAL PURPOSE: AN type CG-572/U (20' 0") RG-108/U cable; 20 ft lg excluding term; has P-405 on one end and P-406 on other end; CADV 90074-1 | Headphone extension cable |

*(ND) No Stoddart drawing.

## TABLE 8-2. STOCK NUMBER IDENTIFICATION

| REF. DESIG. | STOCK NUMBERS FEDERAL | STOCK NUMBERS SIGNAL CORPS | REF. DESIG. | STOCK NUMBERS FEDERAL | STOCK NUMBERS SIGNAL CORPS |
|---|---|---|---|---|---|
| A-401 | N5985-318-7068 | | P-301 | N5935-283-3725 | |
| A-403 | N6625-699-8780 | | P-303 | *N5935-283-3727 | |
| A-404 | N5355-644-1170 | | P-304 | *N5935-553-3306 | |
| C-101 | N5910-196-0524 | | P-401 | N5935-201-3216 | |
| C-102 | N5910-666-5104 | | P-403 | N5935-192-4753 | |
| C-112 | *N5910-112-7843 | | P-404 | N5935-549-6306 | |
| C-113 | N5910-265-5787 | | P-405 | N5935-192-4760 | |
| C-122 | N5910-191-3807 | | P-406 | N5935-254-7682 | |
| C-153 | N5910-280-8393 | | R-101 | *N5905-279-1745 | |
| C-154 | N5910-184-4956 | | R-102 | N5905-299-2030 | |
| C-160 | N5910-669-4943 | | R-115 | *N5905-190-8883 | |
| C-164 | N5910-192-8417 | | R-116 | *N5905-185-8510 | 3RC20BF103J |
| C-165 | *N5910-644-6376 | | R-117 | *N5905-279-3504 | |
| C-173 | *N5910-112-7409 | | R-118 | *N5905-158-4783 | |
| C-301 | *N5910-160-2259 | | R-120 | *N5905-279-3514 | |
| C-302 | N5910 195-8521 | | R-121 | *N5905-254-9201 | |
| C-304 | N5905-667-7705 | | R-122 | *N5905-190-8889 | |
| CR-101 | N6130-237-0152 | | R-123 | *N5905-195-5571 | |
| CR-102 | *N5960-262-0315 | | R-132 | *N5905-518-5595 | |
| E-101 | N6130-313-6382 | | R-133 | *N5905-279-4302 | |
| E-102 | *N5960-669-8808 | | R-135 | *N5905-192-4490 | |
| E-103 | *N5960-262-0015 | 2Z8304.57 | R-136 | N5905-107-8201 | |
| E-105 | *N5960-272-9094 | 2Z8320-13 | R-146 | *N5905-279-1723 | |
| E-114 | *N5960-264-3004 | | R-147 | N5905-114-3341 | |
| E-115 | N5915-382-9660 | | R-148 | *N5905-195-6754 | |
| E-116 | N5985-265-8705 | | R-149 | *N5905-249-3661 | |
| E-118 | N5985-238-7837 | | R-151 | *N5905-243-6821 | |
| E-119 | N5985-238-7840 | | R-152 | *N5905-279-3513 | |
| E-120 | N5985-238-7841 | | R-161 | *N5905-195-6800 | |
| E-121 | N5355-284-4607 | 2Z5821-173 | R-163 | *N5905-195-9482 | |
| E-123 | N5355-284-5595 | | R-164 | *N5905-195-6806 | |
| E-129 | N5355-644-1265 | | R-167 | *N5905-279-3838 | |
| E-130 | N5935-383-1369 | | R-168 | *N5905-299-1993 | |
| E-133 | N5935-224-0753 | | R-169 | *N5905-190-8880 | |
| E-134 | N5935-222-9745 | | R-176 | *N5905-192-0651 | |
| E-301 | N5940-259-7929 | | R-177 | *N5905-107-8024 | |
| F-301 | *N5920-280-4466 | 3Z1927 | R-178 | N-5905-114-3159 | |
| H-301 | N5960-249-4973 | 2Z2636.26 | R-179 | *N5905-539-2479 | |
| H-303 | N5935-223-0580 | | R-183 | N5905-144-8336 | |
| I-101 | G6240-155-8706 | 2Z5952 | R-185 | *N5905-279-1757 | |
| J-101 | N5935-234-1597 | | R-189 | *N5905-279-1890 | |
| J-102 | N5935-283-1260 | 2Z5534A | R-192 | *N5905-195-6453 | |
| J-104 | *N5935-201-2772 | | R-193 | *N5905-171-1999 | |
| J-105 | N5935-201-8153 | | R-195 | *N5905-171-2004 | |
| J-107 | N5935-257-7308 | | R-199 | *N5905-279-2515 | |
| J-301 | *N5935-552-6769 | | R-206 | *N5905-171-1986 | |
| J-302 | *N5935-642-4901 | | R-213 | *N5905-258-2572 | |
| J-401 | N5935-636-8321 | | R-214 | *N5905-192-0390 | |
| J-402 | N5935-189-2962 | | R-301 | N5905-296-7521 | |
| L-101 | N5950-263-1701 | | R-302 | *N5905-279-1752 | |
| L-103 | N5915-642-5051 | | R-303 | N5905-279-3497 | |
| L-114 | N5915-239-5175 | | R-304 | N5905-195-9451 | |
| L-123 | N5950-228-4178 | | R-305 | *N5905-171-1998 | |
| M-101 | N6625-239-8345 | | R-309 | *N5905-299-2015 | |
| O-101 | N6625-312-1614 | | R-310 | *N5905-253-1229 | |
| O-102 | N3032-313-3334 | | R-317 | N5905-665-5226 | |
| O-103 | N6625-294-4566 | | S-101 | N5930-251-6717 | |
| O-104 | N6625-312-1622 | | S-102 | N5930-254-1021 | |
| O-105 | N3020-294-4349 | | S-103 | N5930-248-3406 | |
| O-106 | N3020-204-2979 | | S-104 | N5985-093-7090 | |
| O-107 | N6625-294-4572 | | S-301 | *N5930-050-2638 | |
| P-101 | N5935-295-5414 | | T-101 | N5950-229-5006 | |

*Stock number of replacement part.

TABLE 8-2. STOCK NUMBER IDENTIFICATION (Cont'd)

| REF. DESIG. | STOCK NUMBERS | | REF. DESIG. | STOCK NUMBERS | |
|---|---|---|---|---|---|
| | FEDERAL | SIGNAL CORPS | | FEDERAL | SIGNAL CORPS |
| T-102 | N5950-228-4617 | | W-402 | N6625-188-0379 | |
| T-103 | N5950-228-4613 | | W-403 | N5995-188-0376 | |
| T-104 | N5950-228-4616 | | XF-301 | N5920-391-0551 | 3Z3282-42.14 |
| T-105 | N5950-228-4618 | | XI-101 | N6210-232-1491 | |
| T-107 | N5950-229-6887 | | XV-104 | N5935-259-1944 | 2Z8677-84 |
| T-108 | N5950-231-4458 | | XV-115 | N5935-201-8529 | |
| T-301 | N5950-197-4595 | | XV-301 | N5935-201-4783 | 2Z8678-74 |
| V-101 | N5960-107-7588 | | Z-101 | N5915-151-7826 | |
| V-102 | N5960-188-8634 | | Z-102 | N6625-325-8112 | |
| V-104 | N5960-188-3602 | | Z-103 | N6625-311-8556 | |
| V-109 | N5960-188-0802 | | Z-103A | N5820-308-5120 | |
| V-110 | N5960-262-0185 | | Z-104A | N5820-308-5121 | |
| V-112 | *N5960-262-0155 | | Z-106 | N5915-373-0851 | |
| V-115 | N5960-262-0210 | | Z-108 | N5915-256-0028 | |
| V-117 | *N5960-295-7477 | | Z-110 | N5915-235-3653 | |
| V-301 | N5960-262-0181 | | Z-112 | N5915-235-3635 | |
| V-303 | *N5960-262-0286 | | Z-113 | N5915-368-4564 | |
| W-301 | N5995-508-3350 | | Z-301 | N5915-256-0025 | |

*Stock number of replacement part.

TABLE 8-3. STOCK NUMBER CROSS-REFERENCE

| FEDERAL | REF. DESIG. | FEDERAL | REF. DESIG. |
|---|---|---|---|
| G6240-155-8706 | I-101 | *N5905-299-1993 | R-168 |
| N3020-204-2979 | O-106 | *N5905-299-2015 | R-309 |
| N3020-294-4349 | O-105 | N5905-299-2030 | R-102 |
| N3032-313-3334 | O-102 | *N5905-518-5595 | R-132 |
| N5355-284-4607 | E-121 | *N5905-539-2479 | R-179 |
| N5355-284-5595 | E-123 | N5905-665-5226 | R-317 |
| N5355-644-1170 | A-404 | N5905-667-7705 | C-304 |
| N5355-644-1265 | E-129 | *N5910-112-7409 | C-173 |
| N5820-308-5120 | Z-103A | *N5910-112-7843 | C-112 |
| N5820-308-5121 | Z-104A | *N5910-160-2259 | C-301 |
| *N5905-107-8024 | R-177 | N5910-184-4956 | C-154 |
| N5905-107-8201 | R-136 | N5910-191-3807 | C-122 |
| N5905-114-3159 | R-178 | N5910-192-8417 | C-164 |
| N5905-114-3341 | R-147 | N5910-195-8521 | C-302 |
| N5905-144-8336 | R-183 | N5910-196-0524 | C-101 |
| *N5905-158-4783 | R-118 | N5910-265-5787 | C-113 |
| *N5905-171-1986 | R-206 | N5910-280-8393 | C-153 |
| *N5905-171-1998 | R-305 | *N5910-644-6376 | C-165 |
| *N5905-171-1999 | R-193 | N5910-666-5104 | C-102 |
| *N5905-171-2004 | R-195 | N5910-669-4943 | C-160 |
| *N5905-185-8510 | R-116 | N5915-151-7826 | Z-101 |
| *N5905-190-8880 | R-169 | N5915-235-3635 | Z-112 |
| *N5905-190-8883 | R-115 | N5915-235-3653 | Z-110 |
| *N5905-190-8889 | R-122 | N5915-239-5175 | L-114 |
| *N5905-192-0390 | R-214 | N5915-256-0025 | Z-301 |
| *N5905-192-0651 | R-176 | N5915-256-0028 | Z-108 |
| *N5905-192-4490 | R-135 | N5915-368-4564 | Z-113 |
| *N5905-195-5571 | R-123 | N5915-373-0851 | Z-106 |
| *N5905-195-6453 | R-192 | N5915-382-9660 | E-115 |
| *N5905-195-6754 | R-148 | N5915-642-5051 | L-103 |
| *N5905-195-6800 | R-161 | *N5920-280-4466 | F-301 |
| *N5905-195-6806 | R-164 | N5920-391-0551 | XF-301 |
| N5905-195-9451 | R-304 | *N5930-050-2638 | S-301 |
| *N5905-195-9482 | R-163 | N5930-248-3406 | S-103 |
| *N5905-243-6821 | R-151 | N5930-251-6717 | S-101 |
| *N5905-249-3661 | R-149 | N5930-254-1021 | S-102 |
| *N5905-253-1229 | R-310 | N5935-189-2962 | J-402 |
| *N5905-254-9201 | R-121 | N5935-192-4753 | P-403 |
| *N5905-258-2572 | R-213 | N5935-192-4760 | P-405 |
| *N5905-279-1723 | R-146 | *N5935-201-2772 | J-104 |
| *N5905-279-1745 | R-101 | N5935-201-3216 | P-401 |
| *N5905-279-1752 | R-302 | N5935-201-4783 | XV-301 |
| *N5905-279-1757 | R-185 | N5935-201-8153 | J-105 |
| *N5905-279-1890 | R-189 | N5935-201-8529 | XV-115 |
| *N5905-279-2515 | R-199 | N5935-222-9745 | E-134 |
| N5905-279-3497 | R-303 | N5935-223-0580 | H-303 |
| *N5905-279-3504 | R-117 | N5935-224-0753 | E-133 |
| *N5905-279-3513 | R-152 | N5935-234-1597 | J-101 |
| *N5905-279-3514 | R-120 | N5935-254-7682 | P-406 |
| *N5905-279-3838 | R-167 | N5935-257-7308 | J-107 |
| *N5905-279-4302 | R-133 | N5935-259-1944 | XV-104 |
| N5905-296-7521 | R-301 | N5935-283-1260 | J-102 |

*Stock number of replacement part.

TABLE 8-3. STOCK NUMBER CROSS-REFERENCE—(Cont'd)

| FEDERAL | REF. DESIG. |
|---|---|
| N5935-283-3725 | P-301 |
| *N5935-283-3727 | P-303 |
| N5935-295-5414 | P-101 |
| N5935-383-1369 | E-130 |
| N5935-549-6306 | P-404 |
| *N5935-552-6769 | J-301 |
| *N5935-553-3306 | P-304 |
| N5935-636-8321 | J-401 |
| *N5935-642-4901 | J-302 |
| N5940-259-7929 | E-301 |
| N5950-197-4595 | T-301 |
| N5950-228-4178 | L-123 |
| N5950-228-4613 | T-103 |
| N5950-228-4616 | T-104 |
| N5950-228-4617 | T-102 |
| N5950-228-4618 | T-105 |
| N5950-229-5006 | T-101 |
| N5950-229-6887 | T-107 |
| N5950-231-4458 | T-108 |
| N5950-263-1701 | L-101 |
| N5960-107-7588 | V-101 |
| N5960-188-0802 | V-109 |
| N5960-188-3602 | V-104 |
| N5960-188-8634 | V-102 |
| N5960-249-4973 | H-301 |
| *N5960-262-0015 | E-103 |
| *N5960-262-0155 | V-112 |
| N5960-262-0181 | V-301 |
| N5960-262-0185 | V-110 |
| N5960-262-0210 | V-115 |
| *N5960-262-0286 | V-303 |
| *N5960-262-0315 | CR-102 |
| *N5960-264-3004 | E-114 |
| *N5960-272-9094 | E-105 |
| *5960-295-7477 | V-117 |
| *N5960-669-8808 | E-102 |
| N5985-093-7090 | S-104 |

| FEDERAL | REF. DESIG. |
|---|---|
| N5985-238-7837 | E-118 |
| N5985-238-7840 | E-119 |
| N5985-238-7841 | E-120 |
| N5985-265-8705 | E-116 |
| N5985-318-7068 | A-401 |
| N5995-188-0376 | W-403 |
| N5995-508-3350 | W-301 |
| N6130-237-0152 | CR-101 |
| N6130-313-6382 | E-101 |
| N6210-232-1491 | XI-101 |
| N6625-188-0379 | W-402 |
| N6625-239-8345 | M-101 |
| N6625-294-4566 | O-103 |
| N6625-294-4572 | O-107 |
| N6625-311-8556 | Z-103 |
| N6625-312-1614 | O-101 |
| N6625-312-1622 | O-104 |
| N6625-325-8112 | Z-102 |
| N6625-699-8780 | A-403 |

| SIGNAL CORPS | DESIG. REF. |
|---|---|
| 2Z2636.26 | H-301 |
| 2Z5534A | J-102 |
| 2Z5821-173 | E-121 |
| 2Z5952 | I-101 |
| 2Z8304.57 | E-103 |
| 2Z8320-13 | E-105 |
| 2Z8677-84 | XV-104 |
| 2Z8678-74 | XV-301 |
| 3RC20BF103J | R-116 |
| 3Z1927 | F-301 |
| 3Z3282-42.14 | XF-301 |

*Stock number of replacement part.

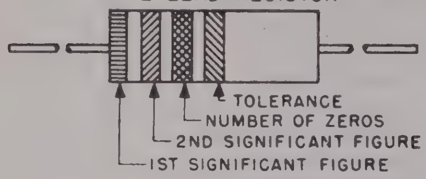
**TABLE 8-4. LIST OF MANUFACTURERS**

| DESIGNATION | MANUFACTURER | ADDRESS |
|---|---|---|
| CADV | Stoddart Aircraft Radio Co. | 6644 Santa Monica Blvd. Hollywood 38, Calif. |
| CAFQ | Radio Receptor Inc. | 251 W. 19th St. New York, N. Y. |
| CAGK | Amperite Company | 561 Broadway New York, N. Y. |
| CAHW | Croname Inc. | 3701 Ravenswood Ave. Chicago, Ill. |
| CAIS | Birtcher Corporation | 5087 Huntington Drive Los Angeles 32, Calif. |
| CAMD | Good-All Electric Mfg. Co. | Ogallala, Nebraska |
| CAN | Sangamo Electric Co. | 1935 Funk St. Springfield, Ill. |
| CANS | Kings Electronics Inc. | 372 Classon Ave. Brooklyn 5, N. Y. |
| CAO | Ward Leonard Co. | 6 South St. Mount Vernon, N. Y. |
| CATK | Acro Electric Co. | 1305 Superior Ave. Cleveland, Ohio |
| CAUP | Kurz-Kasch Inc. | 1421 S. Broadway Dayton, Ohio |
| CAUZ | Jeffers Electronics Co. | Dubois, Pa. |
| CAYS | Drake Manufacturing Co. | 1713 W. Hubbard St. Chicago, Ill. |
| CBGM | Transformer Engineers | 389 S. Arroyo Parkway Pasadena, Calif. |
| CBIM | Switchcraft Co. | 1328-30 N. Halsted St. Chicago, Ill. |
| CBIT | Mueller Electric Company | 1597 E. 31st. Cleveland, Ohio |
| CBN | Central Radio Laboratory Division of Globe Union | 900 E. Keefe Ave. Milwaukee, Wis. |
| CBZ | Allen-Bradley Co. | 118 W. Greenfield Ave. Milwaukee, Wis. |
| CD | Cornell-Dubilier Corp. | 1000 Hamilton Blvd. South Plainfield, N. J. |
| CEB | Eby, Hugh H. | 4700 Stenton Ave. Philadelphia, Pa. |
| CER | Erie Resistor Corp. | 644 W. 12th St., Erie, Pa. |
| CG | General Electric Co. | 1 River Road Schenectady, N. Y. |
| CHS | Sylvania Electric Products Inc. | Emporium, Pa. |
| CHH | Arrow-Hart & Hegeman Electric Co. | 102 Hawthorne St. Hartford, Conn. |
| CJA | Millen, James Mfg. Co. Inc. | 150 Exchange St. Malden, Mass. |
| CLF | Littelfuse Inc. | 4765 Ravenswood Ave. Chicago, Ill. |
| CMA | Mallory, P. R., Co. Inc. | 1941 Thomas St. Indianapolis, Ind. |
| CMG | Cinch Mfg. Co. | 2339 W. Van Buren St. Chicago, Ill. |
| COM | Ohmite Mfg. Co. | 4835 W. Flournoy St. Chicago, Ill. |
| CSF | Sprague Specialties Co. | N. Adams, Mass. |
| CV | Weston Electric Instrument Corp. | 619 Frelinghuysen Ave. Newark, N. J. |
| DMC | Chicago Die Mold Mfg. Co. | 4001 Wrightwood Ave. Chicago, Ill. |

## TABLE 8-5. APPLICABLE COLOR CODES AND MISCELLANEOUS DATA

### COLOR CODE FOR JAN FIXED RESISTORS VALUES IN OHMS

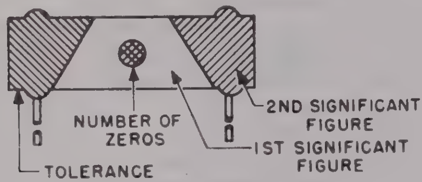
AXIAL LEAD RESISTOR




RESISTOR WITH AXIAL WIRE LEADS

| COLOR | 1ST BAND | 2ND BAND | 3RD BAND | END BAND |
|---|---|---|---|---|
| | VALUE | VALUE | VALUE | TOLERANCE |
| Black | 0 | 0 | None | Gold |
| Brown | 1 | 1 | 0 | ±5% |
| Red | 2 | 2 | 00 | |
| Orange | 3 | 3 | 000 | Silver |
| Yellow | 4 | 4 | 0000 | ±10% |
| Green | 5 | 5 | 00000 | |
| Blue | 6 | 6 | 000000 | None |
| Violet | 7 | 7 | 0000000 | ±20% |
| Gray | 8 | 8 | 00000000 | |
| White | 9 | 9 | 000000000 | |

RADIAL LEAD RESISTOR

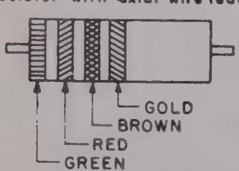



RESISTOR WITH RADIAL WIRE LEADS

| COLOR | BODY | END BAND | DOT | END BAND |
|---|---|---|---|---|
| | VALUE | VALUE | VALUE | TOLERANCE |
| Black | 0 | 0 | None | Gold |
| Brown | 1 | 1 | 0 | ± 5% |
| Red | 2 | 2 | 00 | |
| Orange | 3 | 3 | 000 | |
| Yellow | 4 | 4 | 0000 | Silver |
| Green | 5 | 5 | 00000 | ±10% |
| Blue | 6 | 6 | 000000 | |
| Violet | 7 | 7 | 0000000 | |
| Gray | 8 | 8 | 00000000 | None |
| White | 9 | 9 | 000000000 | ±20% |

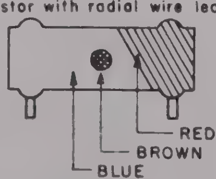
EXAMPLES:

Resistor with axial wire leads




THE RESISTANCE OF THIS RESISTOR IS 520 OHMS ±5%

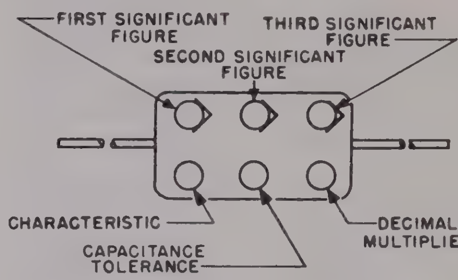
Resistor with radial wire leads




THE RESISTANCE OF THIS RESISTOR IS 620 OHMS ± 20%

### COLOR CODE FOR JAN FIXED CAPACITORS VALUES IN MMF

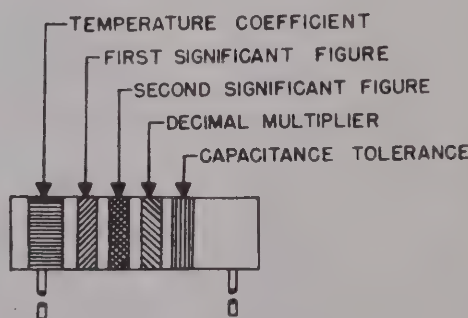
MICA CAPACITOR




MICA CAPACITOR

| COLOR | CAPACITANCE | | TOLERANCE | CHARACTERISTICS |
|---|---|---|---|---|
| | SIGNIFICANT FIGURES | DECIMAL MULTIPLIER | | |
| Black | 0 | 1 | ±20 per cent (M) | A |
| Brown | 1 | 10 | | B |
| Red | 2 | 100 | ± 2 per cent (G) | C |
| Orange | 3 | 1000 | | D |
| Yellow | 4 | | | E |
| Green | 5 | | | F |
| Blue | 6 | | | G |
| Violet | 7 | | | |
| Gray | 8 | | | |
| White | 9 | | | |
| Gold | | 0.1 | ±5 per cent (J) | |
| Silver | | 0.01 | ±10 per cent (K) | |

CERAMIC CAPACITOR




CERAMIC CAPACITOR

| COLOR | CAPACITANCE | | TOLERANCE | | CHARACTERISTICS * |
|---|---|---|---|---|---|
| | SIGNIFICANT FIGURES | DECIMAL MULTIPLIER | CAPACITANCES OF MORE THAN 10 µµf (IN %) | CAPACITANCES OF 10 µµf OR LESS (IN µµf) | |
| Black | 0 | 1 | ±20 (M) | 2.0 (G) | C– |
| Brown | 1 | 10 | 1 (F) | | H– |
| Red | 2 | 100 | ± 2 (G) | | L– |
| Orange | 3 | 1000 | — | | P– |
| Yellow | 4 | | — | | R– |
| Green | 5 | | 5 (J) | 0.5 (D) | S– |
| Blue | 6 | | — | — | T– |
| Violet | 7 | | — | — | U– |
| Gray | 8 | 0.01 | — | 0.25 (C) | B– |
| White | 9 | 0.1 | 10 (K) | 1.0 (F) | SL– |
| Gold | | | | | A– |

* The significance of these letters will be found in the joint Army-Navy Specification JAN C-5.

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# INDEX—(Cont'd)

# INDEX—(Cont'd)

RADIATION HAZARDS

IN RADIO INTERFERENCE MEASUREMENT

1. Biological damage from exposure to intense RF radiation has been known for several years but only recently have quantitative limits been established.

2. A tri-service limit for exposure to RF radiation has been established at .01 watts/cm$^2$ at any frequency. This is 194 volts/meter assuming linearly polarized plane waves. General Electric has proposed that a maximum safe limit of .001 watts/cm$^2$ (61 volts/meter) be used for continuous exposure and that .01 watts/cm$^2$ be an absolute maximum not to be exceeded except under emergency conditions.

3. It is possible that personnel operating Stoddart equipment will be exposed to power densities greater than .01 watts/cm$^2$. This will probably occur in locations where the rf field will not be linearly polarized plane waves such as the Fresnel Zone and in close proximity to magnetrons and klystrons.

4. It is suggested that before taking measurements near suspected or known strong radiation sources that reliable information on intensity be obtained.

Direct measurements of strong signal sources can be made with RI-FI equipment if the frequency is in the tuning

STODDART NO. 40019-A

range. Most RI-FI equipment does not have sufficient voltage range or shielding effectiveness to accurately measure to 194 volts/meter using standard antennas. In some situations, involving concentrated fields, the use of loop probes with their large antenna factors would enable approximate measurement. Limitations in RI-FI equipment shielding sometimes permits full scale meter indication when tuned to a very strong signal even with the antenna disconnected. Needless to say, the operator should be concerned when this occurs.

The following chart provides approximate equipment range limits (full scale) in volts/meter with and without pickup devices.

The equipment would be standardized for gain in accordance with instructions on the charts supplied. Then the input attenuator should be placed in the maximum position. Continuous wave signals would be measured in FI function switch position. Pulsed signals are measured with PEAK function.

STODDART NO. 40019-A

| Equipment | Antenna | Approximate field strength volts/meter Equivalent radiation levels given in table below |
|---|---|---|
| NM-10A | Half meter rod | 2 |
| | 30" loop (90117-2) | 10 |
| (14 kc to 250 kc) | 6" loop (90114-2) | 100 |
| | Loop probe (90185-1) | 1000* |
| | No antenna (or cable) | 100 to 200 |
| NM-20B | 41" rod (90291-2) | 2 |
| | Loop antenna (90298-2) | .1 |
| (150 kc to 25 mc) | Loop probe (90185-2) | 10* |
| | No antenna (or cable) | 20 |
| NM-30A | Tuned dipole | 1 to 50 |
| | Loop antenna (90799-2) | 170 to 500* |
| (20 mc to 400 mc) | No antenna (or cable) | 10 to 500 |
| NM-50 | Tuned dipole | 30 to 180 |
| (375 mc to 1000 mc) | No antenna (or cable) | 100 to 180 |

| Field Strength volts/meter | Radiation Level watts/cm$^2$ |
|---|---|
| 0.1 | $0.265 \times 10^{-8}$ |
| 2.0 | $1.06 \times 10^{-6}$ |
| 10. | $0.265 \times 10^{-4}$ |
| 20 | $1.06 \times 10^{-4}$ |
| 30 | $2.39 \times 10^{-4}$ |
| 50 | $6.63 \times 10^{-4}$ |
| 100 | $0.265 \times 10^{-2}$ |
| 170 | $0.766 \times 10^{-2}$ |
| 180 | $0.86 \times 10^{-2}$ |
| 200 | $1.06 \times 10^{-2}$ |
| 500 | $6.63 \times 10^{-2}$ |
| 1000 | 0.265 |

$$P = \frac{(E)^2}{120\,\pi} = .00265(E)^2 \frac{\text{watts}}{(\text{meter})^2}$$

P = Radiation Level
E = Field Strength - $\frac{\text{volts}}{\text{meter}}$

$$P\frac{(\text{watts})}{\text{cm}^2} = 10^{-4} \times P\frac{(\text{watts})}{(\text{meter})^2}$$

*Maximum measurement shown using loop probe antenna is only practical if RI-FI equipment is not exposed to strong RF field.

ENGINEERING DEPT.
August 27, 1959

STODDART AIRCRAFT RADIO CO., INC.
6644 Santa Monica Boulevard
Hollywood 38, California

STODDART NO. 40019-A